

DISSERTATION

EMOTIONS AND BEHAVIORS OF CHINESE AND U.S. PRESCHOOLERS IN TWO
EMOTIONALLY CHALLENGING TASKS

Submitted by

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ABSTRACT

EMOTIONS AND BEHAVIORS OF CHINESE AND U.S. PRESCHOOLERS IN TWO EMOTIONALLY CHALLENGING TASKS

As children develop during early childhood, they are expected to internalize and follow social rules, so as to interact with people and the larger society in emotionally and behaviorally appropriate ways. But societal expectations and corresponding emotional and behavioral responses of individuals are all embedded in the sociocultural context (Markus & Kitayama, 1991; Rothbaum & Rusk, 2011). Americans typically are more emotionally expressive than Chinese even in early childhood (Camras, et al., 2007; Tardif, Wang, & Olson, 2009). Emotional expression disrupts social harmony and is discouraged in Chinese children, but indicates individuality and is more accepted in American children. In more individualistic cultures such as the U.S., which emphasize autonomy and self-agency, one might be expected to direct behaviors outward to actively change the context to be less distressing; in collectivistic cultures like China, one might be more inclined to modify the self to feel or appear less distressed instead (Rothbaum & Rusk, 2011). Still, contextual demands may affect these patterns, particularly if appropriate behavior in the contexts is highly socialized, such that children may anticipate strong negative consequences for misbehavior.

In this study, the emotional and behavioral responses of Chinese and American preschoolers were compared in two emotionally challenging situations that are important contexts for socialization—resistance to temptation and “breaking” someone’s toy. Thirty-four Chinese (17 females) and 37 American (19 females) 3-3.5 year olds were observed across 5 episodes: 1. Introduction to a temptation toy, 2. Resistance to temptation; 3. Introduction to a clown doll; 4. Solitary play with the clown doll; 5. Period after child “breaks” clown doll

(standard violation). Children's emotional and behavioral responses were coded second by second and the data were analyzed with repeated measures MANCOVAs.

Emotionally, American children were found to be more expressive of happiness and sadness than Chinese children. Chinese children's anger responses showed a cumulative pattern across contexts. Except for the impact on Chinese children's anger, the contextual changes generated children's emotional responses in the expected direction, in that pleasant contexts generated more positive emotions and fewer negative emotions, whereas challenging contexts generated more negative emotions and fewer positive emotions.

Behaviorally, American children were found to display more context-directed distraction behaviors than Chinese children; whereas Chinese children displayed more emotion-focused self-modification behaviors, including focal avoidance and self-soothing. Distraction behaviors of children from both samples varied according to contextual changes: most distraction in resistance to temptation, least distraction during play session, and slight increase in distraction during standard violation. But variation in American children's distraction across contexts was greater than that of the Chinese children.

By taking a culture-specific, context-specific, and process-oriented approach, the study found evidence for cross-culture, cross-context, and cross-time variations in American and Chinese young children's emotional and behavioral responses toward social challenges. Results highlight the importance of considering children's culture, the immediate and preceding contexts, and time course since challenging events occurred when interpreting and responding to young children's behavior in order to more effectively promote positive development in those children.

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CHAPTER 1 – INTRODUCTION AND LITERATURE REVIEW

Introduction

Emotions are functional processes which help ensure the realization of personally significant goals (Barrett & Campos, 1987). Once elicited, an emotion functions as a regulator by triggering corresponding physiological, cognitive, and behavioral processes aimed at attainment of the target goal. When a child is attracted to play with a toy, the emotion of excitement generates corresponding processes, such as increased heart rate, appraisal of attractiveness, tendency to approach, and reaching behaviors. But one goal can elicit multiple emotions and more than one goal can be comparably significant at the same time (Lagattuta, 2005). If the toy is making interesting movements with loud noise, the child may feel excited and fearful at the same time. If the toy is currently being played with by a friend, the child has the desire to get the toy and the need to maintain friendship at the same time. Additionally, a very intense emotion can use up too much of one's energy and distract one from reaching the original goal (Rydell, Berlin, & Bohlin, 2003). Thus, besides serving as regulators of goal-oriented processes, emotions also may need to be regulated by other nonemotional processes depending on personal and contextual demands (Barrett, 2013). The regulation by emotions and regulation of emotions together complete the whole picture of "emotion regulation." But current research on emotion regulation is still lacking such a balanced recognition of both processes. This study aims at adding empirical evidence for this integrative approach.

Early childhood is an important period to study emotion regulation processes. As children's brains mature, cognition improves, verbal ability increases, and socialization experience expands, children are better able to communicate their needs, understand others' perspectives, and evaluate their own behaviors according to standards (Bugental & Goodnow,

1998; Jones, Abbey, & Cumberland, 1998). Thus their repertoires for experiencing, expressing, and adjusting emotions keep increasing. Many children start childcare or preschool during early childhood and must learn to interact with new peers and adults outside their family. Courtesies and obedience to family members need to be applied to new people and situations, which requires internalization and generalization of rules learned in the family. This study will focus on this important developmental period to understand emotion regulation in its early phases.

Emotion, emotion regulation, rules, and standards are closely related to each other and are all deeply embedded within the immediate context as well as the broader cultural background. A child's conceptualization of rules, emotional experiences, need and ability to regulate emotions, and emotional responses can all vary by culture (Markus & Kitayama, 1991; Rothbaum & Rusk, 2011). For a child whose culture emphasizes individual need, freer expression of emotions is accepted and encouraged. For a child whose culture emphasizes group harmony, strict filtering is advocated before any emotion can be expressed. The American and Chinese cultures quite sharply contrast with each other with respect to their emphasis on individual and group benefit. However, there are also important rules to socialize in children across all cultures. For example, the ability to inhibit inappropriate prepotent responses to achieve more important long-term goals is critical for children's school and life success everywhere. The idea that one should not hurt others purposefully is needed by anyone to be a balanced agentic and social being. Similarities and differences in cultural norms may lead to very specific patterns of children's emotional and behavioral processes in emotion- and rule-laden contexts.

The proposed studies will expose Chinese and American preschoolers to two typical tasks of socialization – resistance to temptation and standard violation (mishap) – and examine how

the same context evokes emotion regulation and rule-abiding behavioral strategies from children of two different cultures.

The three main research questions of the studies include,

1. How are American and Chinese preschoolers similar or different in their emotional responses to resistance to temptation and standard violation contexts?
2. How are American and Chinese preschoolers similar or different in their behavioral strategies in resistance to temptation and standard violation contexts?
3. How are American and Chinese preschoolers similar or different in the temporal relationships between their emotional responses and behavioral strategies in resistance to temptation and standard violation contexts?

In Chapter 1, I will review the constructs of emotion, emotion regulation, and sociocultural influence on emotions, based on theories and empirical evidence. I will also review sociocultural differences between China and the U.S., as well as major aspects of socioemotional development in the preschool years. Chapter 2 will outline my first study comparing Chinese and American children's emotional responses in two typical tasks of socialization. Chapter 3 will introduce my second study comparing Chinese and American children's behavioral strategies in the same tasks. In Chapter 4, I will investigate into the reciprocal temporal relationships between children's emotional responses and behavioral strategies, highlighting the integrative processes of regulation by emotion and regulation of emotion. Cross-cultural and cross-context comparisons will also be conducted. I will provide a general discussion of my three studies in Chapter 5.

Theories and Research on Emotions

Emotion has received increasing research attention in the study of human development since the 1980s. I will focus on three contemporary theories that interpret emotion from a developmental perspective, and which have influenced the conceptualization of this study. They are differential emotions theory (DET), functionalist theory, and dynamic systems theory (DS). I try to clarify several questions through my review of theories and empirical evidence: (1) How does one accurately measure children's emotional responses? Are facial displays sufficient evidence that specific emotions are experienced? Why and how does one study the functions and processes of emotions? (2) What is emotion regulation and how does one operationalize it? (3) How do sociocultural factors influence emotional processes in young children?

Emotional Responses

There is a long tradition in the study of emotions of examining facial patterns as observable indicators of unobservable emotional experiences. However, theories vary with respect to the extent to which facial patterns are viewed as accurate expressions of specific underlying emotions. As I will illustrate in the following sections, facial displays are important indicators of emotions, but many other nonfacial indicators within the person and contextual information in the environment are equally or even more useful in the understanding of emotions.

Differential Emotions Theory (DET) and facial expressions of emotions. The Differential Emotions Theory (DET) interprets emotion-relevant phenomena from both a phylogenetic and an ontogenetic perspective (Izard & Malatesta, 1987). It emphasizes the evolutionary basis and universality of human emotions, but also recognizes the joint influence of biology and socialization on emotion development. It has made great methodological

contributions to the study of facial expressions of emotions and stimulated fruitful empirical research to test its theoretical propositions.

Deeply rooted in a Darwinian perspective, DET considers a few fundamental emotions (e.g., happiness, surprise, anger, sadness, fear, and disgust) to be innately determined outcomes of human evolution (Izard & Malatesta, 1987). To be defined as fundamental, the emotion needs to have specific and concordant neurochemical, experiential, and expressive components. Although both the biological maturation of neural substrates and environmental demands jointly influence the experience and expression of emotions, more evolutionary-genetic than environmental influences determine emotional experience and expressions during early development (Izard, et al., 1995). With a specific emphasis on innateness, DET theorists have defended their ideas with studies on infants' facial displays. Their propositions about distinctive and identifiable facial expressions, as well as the expression-experience concordance are appealing because they make emotions "measurable."

DET assumes the existence of invariant expression-experience concordance, which is biologically fixed (Izard & Malatesta, 1987). More specifically, innate emotion programs trigger the feeling of discrete emotions and are reflected consistently through facial expressions, especially for infants and young children who are relatively incapable of voluntarily masking emotions. As Demos (1982, p. 128) stated, "facial expressions in young children represent the primary, the most precise, and the clearest indicators of affective states." Thus, DET has made painstaking efforts to identify facial configurations of discrete emotions and establish discrete expression-experience concordance in specific emotion-eliciting events.

DET argues that infants use the same facial muscle movements as adults to express the same discrete emotions. Back in the 1970s and 1980s, researchers already found that almost all

facial muscle movements observed in adults expressing discrete emotions were identifiable in newborns (Oster, 1978). Even congenitally blind infants developed smiling, laughter, and crying in the absence of direct imitation (Charlesworth & Kreutzer, 1973), although smiling waned in later development in such infants. In order to systematically identify facial muscle movement configurations which correspond to facial expressions as proposed by DET, Izard and colleagues reviewed previous studies on adults' emotional expressions and observed infants' emotional expressions in various emotion-eliciting conditions. Then they developed the Maximally Discriminative Facial Movement Coding System (MAX; Izard, 1979, 1995) - a microanalytic anatomically-based coding system for well-trained judges to code anatomical muscle movements in infants' brow, eye and nose, and mouth regions and apply specific formulas to combine muscle codes and label discrete emotions, such as joy, interest, surprise, anger, sadness, fear, disgust, and physical discomfort/pain. This system has been widely used in the study of infants' and young children's emotions since then.

DET's idea about fixed expression-experience concordance has also stimulated the use of established emotion-eliciting events to trigger expected discrete facial expressions from young children. For example, positive mother-child interactions are supposed to trigger children's happy facial expressions, which are hypothesized to indicate children's internal pleasurable feelings. Researchers have developed emotion-elicitation paradigms to justify event-expression connections both within and across contexts. If DET's hypothesis is valid, one predominant prototypical expression should be observed more frequently than any other expressions in its specific eliciting context (intrasituational specificity) and more frequently in this particular context than in any other emotion eliciting contexts (intersituational specificity) (Bennett, Bendersky, & Lewis, 2002). For example, during tickling, happy facial expressions should be

observed more frequently than fear or surprise. Happy facial expressions should also be more prevalent in tickling than in a fear-eliciting (e.g., exposure to a stranger) or surprise-eliciting context (e.g., presentation of a jack-in-the-box).

The DET assumption that human emotional development starts with a few predetermined discrete emotions, which can be reliably identified through specific facial muscle movements in corresponding emotion-eliciting contexts, is very attractive for its conceptual simplicity and methodological feasibility. Thus, numerous empirical studies have been conducted to justify DET's ideas. Some evidence did support the existence of discrete emotional facial expressions and expression-event concordance, such as the observation of MAX-defined happy and angry expressions among 10-week-old infants when mothers posed these expressions to their infants (Haviland & Lelwica, 1987); stable morphology and frequency in infants' MAX-defined joy, anger, and sadness from 2.5 to 9 months during positive and negative mother-child interactions (Izard et al., 1995); the identification of infants' joy, surprise, anger, disgust, fear, sadness, and interest expressions at both 4 months and 12 months in selected emotion-eliciting contexts (Bennett, Bendersky, & Lewis, 2005); and similar facial expressions between sighted and congenitally blind Italian children of MAX-defined anger, joy, disgust, surprise, interest, sadness, and fear (Galati, Miceli, & Sini, 2001).

However, although discrete facial expressions can be observed in early infancy, whether or not these facial patterns specify particular emotions, even in relatively unsocialized infants, is much more unclear from extant research. Great variability has been evidenced among empirical studies, for which DET lacks a satisfying explanation. Such evidence includes the observation of DET-specified emotion expressions in nonemotional activities or mismatched emotion-eliciting contexts, as well as the absence of expected facial expressions when corresponding emotional

states should exist due to the emotion-eliciting context and other nonfacial responses. For example, Camras (1992) made naturalistic observations on her daughter's facial expressions in the first year of life. Although discrete facial expressions were observable even in the 1st month, they often occurred in contexts with unexpected elicitors, such as fear expressions occurring when the baby was being fed, disgust expressions during bathing and face washing, or sad expressions when eating a sour vitamin. Camras also found surprise expressions to occur in nonsurprising contexts, each time her infant had to raise her head or eyes to look at something above her line of sight, despite the fact that she had seen it many times before in the same location (Camras, 1992).

When intrasituational and intersituational specificities are considered, only happy expressions were found to possess both qualities across peek-a-boo, novel toy, or tickling tasks (Bennett, Bendersky, & Lewis, 2002, 2005; Hiatt, Campos, & Emde, 1979). Although surprise was most common in surprise-eliciting situations (toys that violate infants' expectancy), it was also most common in other emotion-eliciting tasks (e.g., arm-restraint and masked stranger). Anger and fear expressions failed to show intrasituational or intersituational specificity in all extant studies (Bennett et al., 2002, 2005; Camras, Oster, Campos, & Bakeman, 2003; Camras et al., 2007; Hiatt et al., 1979). Although inoculation is a typical pain-eliciting procedure, almost all infants from 2 to 18 months responded with both pain and anger expressions to this event (Izard, Hembree, & Huebner, 1987). Although fear is supposed to be elicited among crawling infants when they are exposed to a dramatic height drop, fear facial expressions were rarely observed on the "deep side" of the visual cliff as expected (Bertenthal & Campos, 1984). In contrast, many other nonfacial responses suggested infants' fear experiences, such as withdrawing, freezing, or detouring around the apparent drop-off.

Therefore, neither the identifiability of infants' discrete facial expressions, nor fixed expression-experience concordance suggested by DET has been fully supported by empirical evidence. Even infants' emotions are more complex than one-to-one links among events, experiences, and expressions. A major limitation of DET's selective measuring of a small range of facial movements is that it cannot separate emotional facial expressions from instrumental or random facial movements. This approach often omits nonfacial emotional responses and other emotion relevant personal and contextual variables, which may be equally or even more important than facial expressions in understanding emotions. Alternative theoretical explanations for these observations have been offered by the functionalist and dynamic systems approach, which I will introduce next.

Functionalist approach and emotional responses. According to the functionalist approach, emotions are bidirectional interactive processes aimed at establishing, maintaining, or changing aspects of a person-environment relationship that have important implications for the person's adaptation to that environment (Barrett & Campos, 1987). Functionalist theory does not define emotion based on particular facial configurations or expression-experience concordance as DET does. It agrees with DET on the usefulness of facial expression in understanding emotions, but only considers it as one window on emotion (Barrett & Campos, 1987). Emotions do not just occur in the brain, in the heart, or on the face, but always unfold in interaction with the immediate environment (Barrett, 1998).

The functionalist approach considers emotions as members of families of related emotions. Each family is associated with particular appreciations of the relation between the environment and the person's goals, ends, and/or needs; action tendencies that are functional given the relation between the ongoing context and those goals, end, or needs; facial, vocal, and

physiological patterns; and adaptive functions served by the emotions (Barrett & Campos, 1987; Campos, Frankel, & Camras, 2004). It is the meaning of the event (Sroufe, 1996), the specific person-environment functional relationship that determines emotion families (Campos et al., 2004). All other criteria, including facial configurations, can be variable among “family members” to a certain extent (Barrett & Campos, 1987). Facial patterns, physiological responses, and self-report of internal feelings can all provide information about emotions, but no single criterion is sufficient to infer that the emotion is experienced.

Considering the complex joint influence of biological maturation and social learning experiences on emotional development, members from the same emotion family do not necessarily share the same facial patterns, members from different families may share certain facial movements, and some emotion families as a whole may lack particular facial expressions (Barrett & Campos, 1987). For example, a smiling face displayed in an embarrassing situation belongs to the shame family rather than the joy family based on its function of expressing submission to external standards. And members from the shame family cannot be accurately identified just from particular facial movements.

According to the functionalist approach, while some emotional responses (e.g., heart rate increase) are consistently triggered in critical situations, because of their established functionality through evolutionary or personal history, the functions of emotions operate at a general level, allowing a broad range of responses to be recruited (Barrett & Campos, 1987; Frijda, 1986). The principle of multifinality allows the function of a particular emotion to be achieved through a number of different responses that are affected by the specific context (Barrett & Campos, 1987; Campos et al., 2004). The functionalist approach is able to explain the empirical observations about expression-context “mismatch” previously mentioned under the DET framework.

Considering Camras' observations of her daughter (1992), a functionalist researcher's explanation might be that rather than being afraid, the infant displayed a general aversion to the food and the intention to pull away from it, leading to pulled back mouth and tightened staring eyes. Thus, the action tendency of withdrawal was manifested through a facial pattern DET identifies as fear. Similarly, the surprise facial expression may not have expressed the baby's feeling of surprise (e.g., Camras, 2000), but rather that the baby widened her eyes to look at something above, with the function being to enable view of the object. To interpret babies' lack of fear facial expressions despite withdrawal, freezing, or detouring behaviors in response to a huge drop-off in height, functionalist researchers argued that although the responses could be viewed as inconsistent, the behavioral responses all served the behavioral regulatory function of fear – helping avoid harm even though the social communicatory function of the facial display was absent (Campos et al., 2004).

The functionalist approach does not expect invariant facial patterns or behavioral responses across different contexts. Instead, it highlights the importance of the adaptive functioning of the individual in the environment and determination of which responses would serve the relevant function in that context. These researchers have stated that “in emotion the end does justify the means, or at least the means reveal what end the person is seeking” (Campos et al., 2004, p. 382). The functionalist approach recognizes the multiple facets involved in person-environment transactions, allowing different individuals to appreciate and respond to different aspects of the person-environment relationship in different ways based on their individualized states, developmental history, and the available resources in context. By denying facial expression as the gold standard and espousing adaptive functions of emotions in person-environment relationships, the functionalist approach allows greater flexibility for emotion

processes and acquires greater explanatory power than DET with respect to a variety of responses that pertain to a particular emotion in a particular context.

Dynamic systems (DS) approach and emotional responses. The dynamic systems (DS) approach is similar to the functionalist approach in conceptualizing emotional responses as part of an unfolding, contextually dependent process. It defines emotions as “self-organizing dynamic processes that are created with respect to the flow of the individual’s activity in a context” (Fogel et al., 1992, p. 122). Thus, it differs from DET’s idea about innate emotion programs, but is similar to the functionalist approach in conceiving emotions as processes with multiple components interacting in ongoing person-context transactions. However, instead of considering specific person-environment functional relationships as the organizing principle for emotions, DS proposes that the dynamic system of emotion operates in a self-organizing manner such that all involving elements actively constrain each other and are important to the system’s status (Fogel et al., 1992; Fogel & Thelen, 1987). Over time, components fully interact and create a relatively stable pattern (attractor) with a coherent organization. Longer scales of time allow each component as well as the whole system to develop. Thus DS puts great efforts in illustrating the temporal trajectories of emotions over different time scales.

Although DS agrees that there are coherent facial patterns that are related to emotions, it disagrees with DET on an isomorphic relationship between internal emotional feelings and external emotional facial actions (Camras & Shutter, 2010). It argues that facial movements are not emotions just by themselves (Fogel et al., 1992; Fogel & Thelen, 1987). It is through recursive dynamic interactions with vocal, gestural, experiential, and contextual components that some facial movements opportunistically coalesce with other operating components in emotion processes and become stable patterns to be recognized (Fogel et al., 1992; Fogel & Thelen, 1987).

Facial movements are just participating components in emotion systems. A complete understanding of emotion requires investigating the mutual relationships among all participating components, which involve both endogenous components of the person (e.g., neural, facial, vocal, or bodily activities, as well as cognitive and experiential processes) and exogenous components in the environment (e.g., task demands, sociocultural context).

Somewhat similar to the functionalist approach, DS considers both the ecological demands and the child's phylogenetic resources and constraints in interpreting infants' facial expressions (Fogel & Thelen, 1987). Because of infants' immature motor abilities and their needs to alter the relationship with the environment (e.g., get nurtured, signal and decrease discomfort), small facial muscle movements that are immediately functional for expressive purposes are developed early on. But they are not well coordinated with other emotion components at the beginning. Improved synchronization among the multiple components is acquired over time. As such dynamic interactions occur repeatedly, the particular set of facial movements gets associated with emotion processes more reliably and precisely, implying a gradual differentiation process in the development of emotional facial expressions (Camras & Shutter, 2010). Based on observations of her own daughter, Camras (1992) elaborated that most negative expressions of young infants (e.g., pain, anger, and sadness) were undifferentiated facial expressions which occurred with different intensities.

Empirical findings regarding facial expressions. Empirically, Matias and Cohn (1993) found that only positive expressions (joy and surprise) were discrete between 2 to 6 months of age during mother-child interactions. Different emotional expressions were found to become gradually context-specific during the 1st year of life, especially for negative emotions such as disgust, anger, and fear (Bennett et al., 2005).

In a recent study with 11-month-old infants from U.S., China, and Japan, distinct fear and anger facial configurations were not observed, although infants' nonfacial behaviors supported the inference that the predicted emotions were elicited (Camras et al., 2007). When anatomic facial expressions were analyzed in motion using the DS methodologies, researchers found that eye constriction and mouth opening served as intensity indicators for both positive and negative emotions (smiles and cry-faces), challenging DET's idea about prewired emotion-specific facial patterns (Messinger, Mattson, Mahoor, & Cohn, 2012; see also Barrett, 2002). Camras and Shutter (2010) reviewed studies about how MAX-specified facial expressions can be reliably identified as discrete emotions by observers. She found the recognition rates were above-chance frequency but far from satisfactory. Additional information of vocal and body actions, as well as the context can help observers interpret the entire constellation as emotional experiences. Such empirical evidence, again, challenges DET's proposition of predetermined discrete facial expressions and highlights the importance of interpreting facial displays in conjunction with other behavioral and contextual parameters.

Summary on emotional responses. There is consensus among the three emotion theories that facial displays do offer rich information about young children's emotions. Empirical studies also highlight the usefulness of microanalytic coding schemes such as the MAX in systematic observation of facial expressions. However, as empirical evidence and the latter two theories suggested, facial displays alone are far from enough to reflect the complexities of emotions. They are just one window, one participating component in a multi-component emotion system, which is dynamically variable across time and context. The functionalist approach offers the alternative to focus on the invariant functions of emotions among other variable indices involved in a significant person-environment relationship. The DS approach also suggests

investigating a variety of interactive personal and contextual factors, as well as their temporal trajectories in both real-time and developmental time scales. I will explore the conceptualization of functions and processes of emotions next.

Functions of Emotions

Throughout the history of psychology research, emotions have been treated as epiphenomena of other physiological or cognitive processes that are either irrelevant or disruptive to the adaptive functioning of human beings. However, research suggests that the functions of emotions are not reducible to other physiological, cognitive, or behavioral processes, but in fact have significant influence on these other processes. The functions of emotions have been recognized in all of the three theories that I have introduced, especially by the functionalists who consider the functions of emotions as the organizing principle of emotion processes and the key in determining which emotion family has been elicited. I will mainly focus on this approach because its reasoning about the functions of emotions is more comprehensive and accommodates the ideas of DET and DS well.

According to the functionalist approach, each emotion family serves particular functions that are adaptive for the person in relation to a particular bidirectional relationship between the person and the environment that has implications for the person's wellbeing (Barrett, 1998; Barrett & Campos, 1987). For example, the emotion family of happiness occurs when the ongoing environment is supportive of the person's realization of his or her goals, desires, needs, and/or strivings. The adaptive function of happiness is to maintain or intensify this positive relationship between the environment and the person's realization of goals, desires, needs, and/or strivings. As a result, happiness promotes approach behavior toward that environment; facial

displays communicating nonthreat, affiliation, and well-being; and openness and creativity of thought.

In contrast, the emotion family of anger is elicited when the environment presents challenging obstacles to the person's goals, desires, needs, and/or strivings. The adaptive function of anger is to help the person in overcoming these obstacles and achieving the goals, desires, needs, and/or strivings that are obstructed. The emotion family of sadness is elicited by person-environment relationships similar to those that elicit anger, but which are accompanied by obstacles that are perceived as unconquerable. The adaptive function of sadness is to abandon the impossible mission, so as to conserve rather than wasting energy in such an uncontrollable person-environment relationship. Note that all three of these emotions could be elicited by the same environment, as the person's perceptions of the likelihood of accomplishing the goals, strivings, etc. change. Emotions are processes that evolve and change over time given the changing person-environment relationship.

The functionalist approach has made great effort elaborating the functions of each emotion family and using them as guiding principles to differentiate and relate different emotions, to clarify emotion processes, and to explain variability in emotional responses. The degree to which emotions resemble each other in terms of their family membership depends on the adaptive functions they share. More specifically, internal-, behavior-, and social-regulatory functions are considered the three major functions of emotions (Barrett & Campos, 1987). Emotions' internal-regulatory function involves the regulation of cognitive, physiological, and experiential/feeling processes. The behavior-regulatory function involves promoting behavior that serves adaptive functions in relation to the person-environment relationship that elicits the emotion. The social-regulatory function involves the communication of the emotion and/or the

situation eliciting the emotion to others and, thus, involving the other person in the emotion process.

These three functions are served by the various behaviors and internal processes involved in the emotion. Like DET, the functionalist approach highlights the internal regulatory functions of feedback from facial displays, drawing on research indicating that facial displays can trigger physiological and psychological processes, including feelings. In addition, even more than DET, the functionalist approach highlights the social regulatory functions of facial displays to share information with social partners and influence the others' behaviors. However, the functionalist approach highlights contextual influences on the specific emotional responses used to serve the internal, social, and behavior-regulatory functions associated with the ongoing emotion, rather than assuming that the same or similar facial displays or other behaviors are invariably associated with the same internal state. Like dynamic systems theory, functionalist theory notes that any particular response cannot be interpreted without reference to context. For example, facial movements that are associated with a discrete emotion may serve other functions in a particular context, such as when wide-opening eyes, which often are associated with surprise, are used to enable the vigilant scrutiny needed to facilitate eye-hand coordination on a challenging task.

More generally speaking, emotions' internal-regulatory function involves the regulation of cognitive, physiological, and experiential processes, as alluded to earlier. For example, anger typically increases breathing rate, heart-rate, body temperature, facial flushing, vocal intensity, and muscle tension, as well as attentional focus on the anger elicitor. All of these processes often happen swiftly without conscious awareness, because they prepare the person to immediately address the implications of the person-environment relationship involved. Moreover, the internal

processes not only promote rapid and vigorous response; they also get individuals ready for behavioral regulation that is pertinent to the person-environment relationship involved. For example, anger initiates powerful problem-oriented behaviors to remove challenging obstacles.

Further, as internal and/or behavioral regulatory processes become apparent to observers, the social-regulatory functions of emotions can also be served. For opponents, one's intensely focused eyes, red face, tense body, and violent movements, which result from anger's internal and behavioral regulation, express the power and ambition of the individual. For teammates, such bodily and behavioral responses might communicate the desire to conquer and the belief in dominance. Thus, anger's social regulatory function of frightening enemies away and strengthening alliance can be realized concomitantly. All these internal, behavioral, and social regulatory processes together help individuals achieve their survival or ongoing goals in their specific context (Barrett, 2013).

A plethora of empirical evidence is consistent with emotion's serving such internal, behavioral, and social regulatory functions. The facial feedback effect was mainly established through research with adults. For example, as college students watched cartoons, they were required to hold a pen either with their lips (inhibiting a smiling facial expression) or with their teeth (creating a smiling facial expression) (Strack, Martin, & Stepper, 1988). Participants reported greater amusing experiences under the teeth condition, although they did not cognitively regard the cartoons to be funnier than the ones under the lip condition. In another similar study, college students' instrumental manipulation of their brow-furrowing muscles led them to report more negative feelings toward aversive photos (Larsen, Kasimatis, & Frey, 1992). The same facial feedback effect has also been replicated with the emotion of surprise and disgust (Lewis, 2012), supporting emotions' internal regulatory effect on the intensity of emotional feelings.

Emotions are also found to be associated with physiological and cognitive processes. For example, during the two minutes in which 6-month-old infants were approached and stared at by a male stranger, infants who displayed more negative emotional responses (e.g., facial fear and sadness, bodily fear and sadness, crying, and escape behaviors) also showed greater right-sided EEG activation and higher cortisol levels (Buss et al., 2003). Similarly, when infants failed to achieve their desired goals (e.g., to trigger the audiovisual display of an attractive slide with an infant smiling and singing, or maintain responsive interactions with the mother), the infants' increased sad expressions were accompanied by higher cortisol responses (Lewis & Ramsay, 2005), whereas their increased anger expressions were accompanied by greater heart rate (Lewis, Ramsay, & Sullivan, 2006). After routine pediatric vaccinations, the duration of infants' pain/distress expressions was associated with the duration of their visual attention (Axia, Bonichini, & Benini, 1999). Among adults, ongoing emotions aroused by eliciting stimuli were associated with individuals' muscular strength (Perkins, Wilson, & Kerr, 2001), movement speed (Naruse, 2004), and the speed and accuracy of cognitive processes (Pronin & Jacobs, 2008). The internal regulatory function of emotions is apparent across various person-environment transactions.

The behavioral regulatory function of emotions can be inferred from a series of studies by Lewis and colleagues with the contingency learning procedure (e.g., Lewis, Alessandri, & Sullivan, 1990; Lewis & Ramsay, 2005; Lewis, Ramsay, & Sullivan, 2006; Sullivan & Lewis, 2003). During a learning phase, infants learned the contingency between their action (usually leg-kicking or arm-pulling) and a desired end (an interesting visual or audiovisual stimulus). During the partial reinforcement phase, the action-stimulus contingency decreased in frequency. During the noncontingency phase, occurrence of the stimulus was completely independent of the

infants' action. During the extinction phase, the desired stimulus disappeared completely after the originally effective action. As infants displayed positive emotions (such as interest, joy and surprise) during the learning phase, they also increased their instrumental behaviors (kicking or pulling) to activate the desired interesting stimulus. Infants displayed increased anger, sad, and instrumental behaviors during partial reinforcement or extinction phase. But increases in instrumental behaviors were only associated with increased anger, rather than increased sadness in these episodes. As contextual parameters change, different behavioral responses are associated with expressed emotions in different ways. When facial, vocal, and postural indices were all considered in children's emotional responses, preschoolers' anger was associated with more coping behaviors than sadness according to contextual demands (e.g., self-distraction in the delay of gratification, problem solving during goal blockage), whereas happiness was associated with broader and more flexible use of strategies when children were required to wait (Dennis, Cole, Wiggins, Cohen, & Zalewski, 2009). Such findings are consistent with the functionalist proposition that anger promotes the action tendency of acting to overcome obstacles and achieve goals, whereas happiness relates to the action tendency of maintaining or expanding ongoing behaviors which bring desired outcomes (Barrett & Campos, 1987; Campos, Mumme, Kermoian, & Campos, 1994). As contexts introduce different expectations and possibilities for children's actions, emotions organize children's behaviors in different ways to serve their particular adaptive functions.

The social regulatory function of emotions is especially apparent from parent-child interactions. For example, when viewing slides of infants' facial display of negative expressions, mothers were able to discriminate between distress, anger, and sadness and reported differentiated response tendencies to these emotions (Huebner & Izard, 1988). For infants'

distress, mothers tended to minister to the infants' need immediately. For infants' anger, mothers were more likely to be annoyed and exercise discipline. For infants' sadness, mothers responded with more interactive talk and play activities. Consistent with both DET and functionalist approaches' reasoning that sadness encourages nurturance from social partners (Barrett & Campos, 1987; Huebner & Izard, 1988), toddlers were found to display more frequent and intense sadness when looking at their mothers during fear- and anger-eliciting situations (Buss & Kiel, 2004). Although fear and anger were the target emotions in the context (approaching stranger, toy removal, and toy in locked box) and toddlers did express the target emotions as expected, functional change in expressions were observed when eye contact allowed toddlers to exert influence on their mothers. In the mother-child relationship across these negative contexts, sadness is reasonably a more functional emotion than fear or anger to elicit support and help. Thus, the social regulatory function of emotion is also deeply contextualized that its operation varies across the resource, target, and context of emotion.

Therefore, empirical evidence has lent strong support to the internal, social, and behavioral regulatory functions of emotions as the functionalists advocated. Emotions promote individuals' adaptation to the social and nonsocial environment in relation to the goals and relationships with which the emotion is concerned. Their function in adjusting person-environment relationships is a central criterion to infer the generation of emotions and to differentiate different emotions from one another. Thus the functions of emotions are essential in emotion research.

However, the function of emotions cannot be directly assessed through the easily observed facial displays or external behaviors in isolation. The various internal, social, and contextual processes which are relevant to the significant person-environment relationship

should be jointly considered (Barrett, 2013). Conceiving emotions as bidirectional person-environment interactions means that any change in the individual or in the environment will change the relationship between the two, and can lead to further changes in the person and the environment (Barrett & Campos, 1987). Depending on what is available in the context and what is possible for the person, morphologically different responses may serve the same function while morphologically identical responses may serve very different functions (Barrett & Campos, 1987; Campos et al., 2004). Thus, a systematic analysis of the changes of various personal and contextual indices, as well as their evolving relations across time and contexts is essential for a higher level inference about the functions of emotions (Barrett, 1998; Witherington & Crichton, 2007). As functionalists provide an insightful overarching principle to look beyond isolated displays, responses, and elicitors of emotions and to focus on their interactions and the underlying adaptive meanings, the dynamic systems approach has specifically delved into the fine-grained investigation of such systemically dynamic processes. I will introduce the dynamic systems approach next to clarify their interpretation of the fluidity and stability of emotions and highlight their methodological contribution to the research on emotion processes.

Process of Emotions

The functionalist and dynamic systems (DS) approaches, as well as many other contemporary emotion researchers rarely conceive emotions as static states isolated from the environment or other psychological processes. Instead, emotions are conceived as unfolding overtime through the ever-changing person-environment relationship. They are fluid processes, varying across time and situation. The DS approach specifically endeavors to understand the process of emotions. Instead of focusing on a higher level organizing principle such as innate emotion programs or the function in person-environment transaction, the DS approach targets at

“the local details of individual acts—‘their fit’ to the specific context” (Thelen & Smith, 1994, p. 216). The person-context-time synergy represents its level of analysis. It examines what specific patterns among the participating components lie inside the individual’s ongoing emotion processes now and here and under which conditions the patterns remain stable or generate change. The patterns per se, rather than external driving forces or emergent functions of the patterns, represent the focus of DS. Continuously indexed by time, emotions are smoothly threaded from instantaneous processes to lingering states and stable personal characteristics.

According to DS, ongoing emotion processes represent the cooperative organizations among various components which are available and relevant in context (Fogel et al., 1992; Fogel & Thelen, 1987). These components can either be endogenous in the person (e.g., neural, facial, vocal, or bodily activities, as well as cognitive and experiential processes), or exogenous in the environment (e.g., task demands, sociocultural context). They are all loosely and flexibly assembled at the beginning, but they gravitate to more stable status because of the self-organizing principle that dynamic systems “spend most of their time in some stable pattern that is recognizable and repeatable” (Fogel et al., 1992, p. 132). Thus, once emotional patterns are constructed through the components’ dynamic interactions, they tend to remain as stable attractors for all the componential sub-processes, even in the face of minor perturbations (Fogel & Thelen, 1987). In the example of emotion expressions, according to DS, newborns’ various facial movements are not primarily well patterned to indicate specific emotions, but have the potential to be parsimoniously utilized for diverse instrumental, communicative, or haphazard functions. When the same facial patterns are inconsistently observed in different emotion-eliciting contexts or nonemotional situations, it is due to the infants’ “opportunistic use of elements already in place” (Fogel & Thelen, 1987, p. 754). It is through recursive interactions

with other perceptual, experiential, and contextual factors that certain facial patterns gradually differentiate to acquire more stable emotional meanings when all factors are within an appropriate range of values (e.g., infants raise lip corners when looking at the mothers in a positive interaction). The facial patterns then become more easily activated or fine-tuned to be integrated into dynamically stable emotion processes (Camras & Shutter, 2010).

Being dynamically stable implies that emotion processes may evolve through a range of moment-to-moment states but still maintain the same emotion quality. To achieve dynamic stability, emotions' various constituents are allowed to fluctuate within a range of values, and emotions unfold as ongoing context-specific synchrony in real time. But when the value of a specific constituent exceeds the tolerable range, it may act as a control parameter, driving the system through a phase shift into a new form of organization (Fogel & Thelen, 1987). These may include situations like a thorough change in task demand (e.g., from a smooth interaction with environment to a challenging obstacle on the way) or a qualitative change in cognitive ability (e.g., from egocentric thinking to the appreciation of other people's different perspectives). As different elements act as the control parameter at different times and in different contexts, the emotion systems go through disorganization, organization, and reorganization continuously among its dynamically interacting elements.

The DS researchers have also applied the same self-organizing principles to bridge real time emotion processes with ontogenetic emotion development (Lewis, 2000). Specifically, recurring real time emotion processes (e.g., smile with pleasure when seeing the mother's face during positive interaction) will become progressively entrenched, contributing to the formation of enduring emotion patterns across time and context (e.g., consistent comfort and pleasure about the relationship with the mother). As a consequence, the formed macroscopic emotion pattern

will serve as one constraint variable in future context-specific emotion processes, interacting with all other co-occurring parameters (e.g., draw one's attention to the significant mother-child relationship when the dyad is in conflict). Thus, both real time emotion processes and emotion development are constructed through the orchestra of various individual-, task-, and context-specific components and are actively involved in each other's operation (Lewis, 2000).

At the same time, despite their equal importance to the holistic dynamic system, components involved in a common emotion process often do not develop at even paces (Fogel & Thelen, 1987). Development or variation in any specific component may bring in something different to the emotion process. For example, newborn babies' smiling face during sleep does not co-occur with their cognitive ability to appreciate external events as making them happy. A toddler's smile at the mother may also be accompanied with behavioral responses such as hugging or kissing. A preschooler's smile upon receiving a disappointing gift involves the appraisal of both the unattractiveness of the gift as well as the contextual requirement to be polite. As they operate, emotion processes are flexibly adapting to the significant changes in the components, along both immediate and ontogenetic time scales (Fogel & Thelen, 1987).

These ideas about the stability and variability of emotion processes have gained increasing empirical support since the proposition of DS. For example, by meticulously examining the moment-to-moment changes in infants' smile under different time and context parameters, Fogel, Messinger and colleagues found different but fluidly changeable patterns of infants' smiles. During mother-infant interactions, infants' smile graduated from non-Duchenne smile (just lip corner raise), to Duchenne smile (lip and cheek raise), to Duchenne smile plus mouth open as the interactions proceeded and escalated over time (Messinger, Fogel, & Dickson, 1999, 2001). Duchenne smile usually followed non-Duchenne but lasted longer. Non-Duchenne

smile was most frequent in the peekaboo game, whereas Duchenne smile was the most frequent during tickling (Fogel, Hsu, Shapiro, Nelson-Goens, & Secrist, 2006; Fogel, Nelson-Goens, Hsu, & Shapiro, 2000). Tickling in general elicited more and longer smiles than peekaboo. The level of affect sharing and visual engagement was associated with the progression in infants' smiling intensity (Messinger et al., 1999, 2000). Particular configurations of infants' smile, gaze, and contextual values were found to characterize infants' different types of enjoyment, including enjoyment of readiness to engage in play (non-Duchenne smiles while gazing at mother during peekaboo), enjoyment of relief (non-Duchenne smiles while gazing away from mother after being tickled), enjoyment of participation and agency (Duchenne smiles with gaze at mother during the climax of early tickle game trials), enjoyment of escape (Duchenne smiles while gazing away during tickle climax), and enjoyment of build-up (Duchenne smiles plus mouth open during the climax of later trials) (Fogel et al., 2000).

By grounding their analysis in real time emotion processes, DS researchers identified context-specificity and temporal transitivity as critical properties that should not be ignored in emotion research. Such microanalytic, process-oriented empirical efforts get researchers closer to the dynamic nature of emotion processes. They move beyond DET's emphasis on decontextualized facial displays by synchronizing co-occurring emotion relevant parameters in ecologically meaningful ways. Facial displays get incorporated into the natural flow of emotion processes. It is also through such a joint consideration of both personal and contextual factors that the functions of emotions can be identified more accurately from both variances and invariances embedded in critical person-environment relationships.

However, it is methodologically challenging to identify all the relevant parameters involved in a specific emotion process, let alone the possible organizational states that can be

generated from various interactions among the parameters. The DS researchers have specified very systemic procedures in their investigations of emotion processes (Camras & Witherington, 2005; Thelen & Smith, 1994). Defining the level of analysis is considered as the most basic step, because dynamic systems are hierarchically nested that each component of a larger system (e.g., an infant's smile involved in a positive dyadic interaction) is a dynamic system on its own (e.g., a smile is achieved through the coordination of various facial muscle movements and appraisals of the event). Clearly specifying the target emotion system and the selected components for investigation are essential in operationalizing the stability and variability of the system's dynamics. The next step is to identify the relatively stable "attractor" states and the control parameters which push the system out of the "attractors" and into phase shifts. This is achieved by dense sampling of events over time and microanalytic analysis of the events' trajectories. A more advanced but less addressed step is to experimentally alter the identified control parameters, so as to examine whether they change the system's operation as expected. All of these methodological principles are challenging but intriguing, considering the complexities involved in any dynamic system and the importance to understand such complexities.

The DS researchers have also made great efforts developing feasible techniques to apply the dynamic systems approach to emotion studies. For example, Lewis and colleagues (Hollenstein, 2013; Lewis, Lamey, & Douglas, 1999; Lewis, Zimmerman, Hollenstein, & Lamey, 2004) have developed the State Space Grid (SSG) – a graphical approach which is used to derive coherent emotion patterns from two sets of observable behaviors. A state space is a hypothetical landscape of behavioral habits that have stabilized over time. Two emotional indices (e.g., expressed emotions and instrumental behaviors) can be plotted, as they proceed in real time, on a grid representing all possible combinations of them. Each point on the grid represents a two-

event co-occurrence (e.g., one expression plus one behavior). Lines in the grid represent the movement of each index from one “state” (combination of the two indices) to another. From this, regularities of patterning in the durations, trajectories, and likelihood of each event can be derived and statistically tested, as can the variability (flexibility) among different “states” and/or presence of “attractors” for each participant.

Both functionalist and DS approaches suggest that emotion processes are multicomponential, involving various dynamically interacting personal and environmental factors. Functionalists emphasize emotion processes, because changes in these processes help researchers understand the emotions in that context, including what functions are being served by different behaviors, what behaviors are being used to fulfill those functions, which behaviors are more and less successful in achieving those functions, how different individuals are similar and different in the patterning of these behaviors, and so on in response to specific, significant person-environment relationships. DS researchers are interested in describing the particulars involved in emotion processes per se, especially the critical values of control variables which render the systems stable versus malleable. Their specific emphasis on characterizing ongoing emotion processes has led to methodological progress in ways of examining temporal trajectories of emotion measures in relation to one another. Their empirical findings have justified the usefulness of this approach in revealing the critical role of contextual specificity and temporal transitivity in emotion processes, as well as important relations between real time emotion processes and development over longer time-frames. Thus, careful analysis of dynamic emotion processes, in context, is essential for understanding the functions, organization, and transitions among emotions.

Informed by the DET, functionalist, and DS approaches, my research will jointly incorporate facial displays, other nonfacial emotional behaviors, and contextual parameters as evidence for emotions. In addition, putative regulatory behaviors (behaviors associated with emotion regulation in the literature) will be studied. I will use DS methods to analyze the real time trajectories of these indices as they unfold in particular contexts. The functionalist principles will be adopted in determining the functions served by the emotional indices and putative regulatory behaviors, based on the observed trajectories, as well as the efficacy of the different regulatory behaviors in relation to various emotions in the various contexts. However, to understand the conceptualization and selection of putative regulatory behaviors and their role in the adaptiveness of an individual's particular emotion in a particular context at a certain time, the construct of "emotion regulation" is worth clarifying.

Emotion Regulation

With deepened understanding about the functions and processes of emotions, the construct of "emotion regulation" has captured increasing attention among researchers. This construct helps explain "how and why emotions organize or facilitate other psychological processes (e.g., focus attention, promote problem solving, support relationships)" and why they sometimes need to be regulated or "they can have detrimental effects (e.g., disrupt attention, interfere with problem solving, harm relationships)" (Cole, Martin, & Dennis, 2004, p. 317). However, the definition and exploration of this construct has been inconsistent among researchers. Cole et al. (2004) summarized some common approaches toward emotion regulation that had been adopted by researchers in the field.

For example, some researchers simply equated positive emotions to adaptive functioning/good regulation and negative emotions to maladaptive functioning/dysregulation.

Some researchers excluded maladaptive processes from emotion regulation, whereas some researchers argued that emotion regulation can be either adaptive or maladaptive. Some researchers only focused on the regulation by emotions (emotions' regulatory effects on other processes). Some only focused on the regulation of emotions (the modulation of emotions by other processes). Some considered both regulation of emotion and regulation by emotion as essential components of emotion regulation. And some others rejected the differentiation between emotion and emotion regulation because emotions are inherently regulatory. As one can see, although emotion regulation is a very hot topic in emotion research, it suffers greatly from conceptual incongruence. I will review both theories and empirical evidence about emotion regulation and submit that emotion regulation involves both regulation by emotions and regulation of emotions, both of which have to be evaluated in context in order to determine their adaptiveness.

To begin with, no emotion, whether positive or negative, is always adaptive or always maladaptive. All emotions can be adaptive under some conditions, but maladaptive under other conditions. As mentioned in the section on functions of emotions, despite the fact that one has a positive valence, and the other has a negative valence, both happiness and anger can motivate adaptive approach behavior. Happiness motivates individuals to maintain and increase desired person-environment interactions through flexible use of various strategies, and anger motivates individuals to overcome obstacles through persistent effortful attempts toward challenge in contexts when problem-oriented coping is expected (Barrett & Campos, 1987; Campos, Mumme, Kermoian, & Campos, 1994; Dennis, Cole, Wiggins, Cohen, & Zalewski, 2009). Generally, children with a propensity toward positive emotions have been found to function well in social relationships (Eisenberg et al., 1996). But children whose positive emotions are overly intense,

such that they can hardly restrain their excitement and impulses, have been found to display more externalizing behavior (disruptive conduct problems and attention-deficit/hyperactivity disorder; Barkley, 1997; Fox, Henderson, Rubin, Calkins, & Schmidt, 2001; Rydell, Berlin, & Bohlin, 2003). Similarly, children who are particularly *easily* irritated and/or have *intense* anger have also been found to have problems with externalizing behaviors (Rydell, Berlin, & Bohlin, 2003). Just as anger can promote adaptive, goal-directed behavior or, especially when extreme, maladaptive behavior, other “negative” emotions can promote both adaptive and maladaptive behavior. Individuals who empathetically experience sadness to another’s sorrow or feel guilty about harming others are more likely to engage in prosocial, adaptive behavior toward the hurt person than those who lack such “negative” emotions. On the other hand, extreme sadness may promote maladaptive withdrawal and extreme guilt has been associated with depression (Barrett, 2013). Thus, valence or emotion category alone should not be used in determining emotions’ adaptiveness.

Because of the dialectical nature of emotions, it is important to both intensify their beneficial effects and restrict their unfavorable effects. As many contemporary emotion researchers suggest, both regulation by emotions and regulation of emotions should be incorporated in the study of emotion regulation. For example, DET researchers advocate conceiving of both emotion utilization and regulation of emotions as two mutually beneficial processes involved in emotion regulation (Izard, Stark, Trentacosta, & Schultz, 2008), although their definition of emotion regulation is more specific than that found in most other theories. Emotion utilization “is the harnessing of an emotion’s inherently adaptive motivation/feeling component in constructive affective-cognitive processes and actions” (Izard, 2009, p. 15). The regulation of emotions is the “modulation of emotion feelings and related expressions and

actions to facilitate emotion utilization” (Izard et al., 2008, p. 158). Thus the regulation of emotions is described as a subordinate process of emotion utilization, which is the ultimate goal of emotion regulation.

Functionalist researchers believe that “regulation by emotion is inherent in each emotion process, and promotes adaptation to the issues with which the emotion is concerned” (Barrett, 2013). Not only do emotions regulate the person’s own behaviors and internal processes and those of others; by exerting influence on these cognitive, behavioral, and social processes, emotions modify their own quality and intensity, both as a direct result of the behaviors (e.g., gaze aversion lowers heart-rate) and as a result of their impact on the environment. For example, goal-directed behavior promoted by anger may enable the person to overcome the obstacle that elicited the anger, leading to diminution of anger and/or its replacement with happiness or pride. But when emotion is dysfunctional because it is overly intense or promotes responses that are maladaptive in relation to the context, or in relation to goals and needs other than those on which the emotion focuses, the regulation of emotion is needed (Barrett, 2013).

For example, if a young child is angry about a peer’s refusal to share a valued toy, the anger may make the child focus on overcoming that barrier and may motivate an aggressive act against the peer. This may succeed in overcoming the obstacle to the goal about which the anger was aroused (gaining the valued toy), but it may cause damage to the child’s relationship with the peer, which may also be valued by the child. So, the focused, adaptive regulation around the anger-related goal undermines the maintenance of another valued goal—friendship with the peer. In addition, when acting as regulators of other processes, emotions can “be too intense or not intense enough, they can be of the wrong quality in a particular context, or they can be in violation of a social norm, again in certain contexts” (Campos et al., 2004, p. 382). Thus the

functionalists are similar to DET in recognizing both regulation by and of emotions, but consider the regulation of emotion as more than a subordinate process of emotion utilization. The regulation of emotions may facilitate other nonemotional processes or accomplishment of more important or long-term goals or concerns, such as promoting social harmony, gaining others' friendship, or finishing one's schoolwork, without being trapped by ongoing emotions which do not favor those behaviors.

Many functionalist researchers recognize that it is usually impossible to empirically disentangle emotion and emotion regulation (e.g., Barrett, 2013; Thompson, 2011) and some even claim such effort is useless (e.g., Campos et al., 2004). The appreciation of a significant person-environment relationship induces a particular action tendency, regulates motivation, promotes choice of particular types of responses, and becomes updated by information about the changing person-environment relationship (Campos et al., 2004). Thus, emotion processes are always being concurrently regulated in relation to one's goals, past experience, the hedonics of the emotion, and emotion communication among social partners. Emotion processes can be dysregulating considering specific contexts, but are never unregulated (Campos et al., 2004). The DS researchers hold a similar stance that "the synchronization of systems underlying emotion includes regulation of each system by the others" (Lewis & Stieben, 2004, p. 372).

However, despite the infeasibility of completely separating emotion and emotion regulation empirically, many researchers (e.g., Barrett, 2013) still consider it useful to conceptually differentiate regulation by emotion and regulation of emotion. It is both important and practical to coach individuals about mindful and voluntary regulation of emotions, so that one can further increase adaptiveness and decrease maladaptiveness in particular contexts. And whether the regulatory behavior originates in the emotion process itself or is purposefully

enacted to regulate the emotion, it is useful to observe empirically the extent to which is successfully reduces the intensity of the emotion (functions to down-regulate the intensity of the emotion; Barrett, 2013).

Methodologically, functionalist researchers propose using process-oriented, observations of multiple, contextualized indices of emotion and of the person-environment transactions over time (Barrett, 2013). First, observations of facial, vocal, gestural, physiological, behavioral, and/or verbal responses are needed; because disparities among responses are not only prevalent, but can also imply the regulation of emotions (as when there is contextual and physiological evidence of negative emotion, but the face looks neutral or positive, suggesting that the person is regulating facial displays) . As part of this observation, putative regulatory behaviors should be observed, as regulation by and of emotions are suggested to occur in an interdigitating manner. Secondly, the change in responses over time (e.g., intensity and type of emotions, type and frequency of regulatory behaviors) should be the target. Not only are the person-environment transactions ongoing processes that keep evolving; but the regulation by emotion and regulation of emotion are also codependent. Without a dynamic observation of the unfolding process, the interpretation of emotions is at best incomplete if not inaccurate. Lastly, characteristics of the person and context have to be carefully considered. Individuals of different ages, with different temperaments, or from different cultural backgrounds may differ in their overarching goals, their likely responses to the particular context, as well as their likely experience with similar emotional events in the past, leading to individual differences in interpretations and response propensities to the ongoing person-environment transactions. Emotional and regulatory patterns in both a baseline context and in several similar contexts are needed to identify what particular functions one's emotions are really serving in response to what specific aspects of the context.

DS researchers have also made the methodological suggestion to tease apart “one aspect of emotion regulation and study its relation to the remaining constituents of emotion” (Lewis & Stieben, 2004, p. 372). This is exemplified by research about the neural processes involved in emotion, in which researchers were able to investigate how the prefrontal cortex displayed different patterns of activation as participants demonstrated different types of cognitive control over emotion-eliciting tasks. Although it is impossible to exhaustively determine all constituents involved in emotion processes at all levels, the DS approach did offer a feasible strategy to reveal the dynamic relationships among some easily accessible emotional indices, such as neurological, physiological, and behavioral responses. As long as researchers specify their scope of investigation and their definition of emotion and emotion regulation clearly, such empirical efforts should serve as valid initial steps of a more comprehensive understanding toward the essence of emotion processes.

Based upon such theoretical and empirical support, I will conceptually distinguish the regulation by and of emotion in my research and adopt the methodological suggestions offered by both the functionalist and DS approaches. More specifically, my working definition of the regulation by emotion is illustrated by the changes in social processes, instrumental behavioral processes, verbalizations, and attentional processes that immediately follow an emotional response. And my working definition of the regulation of emotion is changes in emotion responses that immediately follow putative regulatory responses, such as attentional processes, self-directed behavior, or social comfort -seeking. I will analyze the dynamic changes of each of these processes in relation to each other in real time to clarify their roles as regulating and regulated. I will also use context-specific designs to interpret their functionality and adaptiveness. However, as briefly mentioned above, both regulation by and regulation of emotion are

influenced by the larger sociocultural context, which is a particular focus of this study. I will review on this topic next.

Sociocultural Influence on Emotions and Emotion Development

Almost all contemporary emotion theories acknowledge sociocultural influences on emotions. As discussed above, DET considers basic emotions to be based in evolution and universal across cultures, as reflected in both their facial expressions and motivational functions. Some empirical findings have been interpreted as supporting the universality of emotion recognition across a variety of populations (e.g., Izard, 1969), even with people from preliterate tribes who were not influenced by western culture (e.g., Ekman & Friesen, 1971). For example, when observers in U.S., Japan, Chile, Argentina, and Brazil were shown photos of different facial expressions and asked to match them with six primary emotion words, the same matching between faces and emotion words was found in all these countries (Ekman & Friesen, 2003).

However, these studies have been criticized for a number of reasons. First, participants in most of these studies were required to make decisions among a small set of preselected posed facial patterns. Given a larger set of choices or the freedom to provide any emotion label, most participants generated many qualitatively different emotion labels for the same facial pattern, and their decisions changed as the available choices changed. Secondly, matching scores in these studies were confounded by the fact that participants compared the target photo with other photos presented in the trial and used an iterated process of elimination to make their decisions about emotion labels. Thus, the more faces a participant viewed, the higher matching score the participant obtained. Moreover, there is much evidence that judges agree more on posed patterns than those that naturally occur; yet it remains unclear whether naturally occurring facial expressions would be classified in these same predetermined, discrete categories. In fact, studies

that afforded judges the opportunity to rate facial patterns on dimensions rather than discrete categories were able to do so reliably. Moreover, the studies of preliterate cultures, unable to use written communication, had consultants from those cultures provide stories of events that would elicit those facial displays. Thus, it is not surprising that participants nonrandomly selected the “correct” facial display for that story, but this does not necessarily mean that the facial displays were interpreted as reflecting the same emotion categories (or even, that they reflected emotion at all) (Nelson & Russell, 2013; Russell, 1994).

Many other studies failed to find acceptable recognition rates when they instituted changes in the research designs to address these criticisms, such as using spontaneous rather than posed facial displays, or offering a wider range of emotion words rather than predetermined basic emotion labels for observers to choose (e.g., Naab & Russell, 2007; Yik, Meng, & Russell, 1998). Thus DET’s proposal that universal facial displays specify specific, discrete basic emotions is not consistently supported by empirical evidence. The research suggests that facial patterns are judged systematically as meaningful across a wide array of cultures, but it is much less clear that they specify the same discrete emotions across those cultures.

Both the functionalist and DS approaches consider sociocultural influences on emotions to be prevalent throughout the lifespan. For example, the functionalist researchers mentioned that babies in U.S. culture are occasionally left with substitute caregivers whereas Japanese babies seldom have such experiences, leading to babies’ different levels of stranger anxiety (Barrett & Campos, 1987). The DS researchers also pointed out that even in the first days of life, infants experience culturally specific emotional information, such as the different levels of exposure to arousing stimulation, the different intensities and patterns of social interactions, and the different responses they receive from adults (Fogel et al., 1992).

Empirical evidence suggests that infants' differentiation of others' emotions first occurs in naturalistic interactions with their caregivers, before they can recognize emotions from static images, isolated faces or voices (Walker-Andrews, 2008). Thus, "acculturation of emotions is a socially co-constructed process that arises out of each infant's detection of invariants in emotional gradients that are embedded in social routines" (Fogel et al., 1992, p. 136). Infants in different cultures not only have different propensities to encounter various significant person-environment transactions, but are also exposed to culturally specific interaction patterns and emotion qualities.

Common across cultures and populations are the social communicative functions of emotions and the need to maintain social orders. Almost all societies have developed systematic principles about emotions to prevent "harmful" ones from spreading, escalating, or causing significant conflicts. Even the DET approach recognizes that the degree to which cultures differ in their attitudes toward emotions will influence individuals' emotion processes beyond the evolutionary-based qualities of emotions (Izard & Malatesta, 1987). Thus, even those who emphasize the universal, biological basis for "basic emotions" have conducted research on culture-specific conventions of emotion expressions, the so-called "display rules." For example, when watching a stress-inducing film alone, the same facial expressions for fear, disgust, and distress were observed from both Japanese and American college students. But in the presence of a research assistant, Japanese masked their negative emotions more than the Americans, indicating the Japanese greater tendency to inhibit negative expressions in social contexts (Ekman & Friesen, 2003).

The functionalist researchers explicitly clarified the internal, social, and behavioral regulatory functions of display rules. Given culture-specific social expectations about emotion

expressions, the social regulatory functions of emotions change through socialization from primarily signaling the person's intentions and emotions to enabling smooth social interaction in that culture. In many cases, display rules lead to substitution of a known facial pattern, such as a smile, "borrowing" the social regulatory function of that display. However, these "fake" smiles may look somewhat different, communicating not only that the person is nonthreatening, socially appropriate, etc., but also that the person actually feels differently. As facial patterns are adjusted according to social standards, internal feelings, cognitions, and physiological processes are influenced based on facial feedback, fulfilling the internal regulatory functions of emotions. Behaviorally, socially expected actions in keeping with the display rules will be needed, motivating regulation of behaviors. Thus, emotion display rules, which are constructed by and utilized for specific cultures, affect all aspects of emotion, not simply facial expressions. Cultures "have different expectations regarding how much emotions, in general, should be regulated, as well as which emotions should be regulated in which contexts" (Barrett, 2013).

As functionalists have summarized, the significance of a person-environment relationship comes from three sources: prewired significance from evolutionary history, concurrent significance from ongoing goal pursuit, and learned significance from social communication (Barrett & Campos, 1987). Not only is the concurrent and learned significance deeply embedded in the sociocultural context, but even primitive significance originally based in evolution is open to sociocultural influence, such as the learned disgust toward sugar when one learns about its harm to health. Concurrent significance in goal pursuit is influenced by socialization because such pursuit often happens in a sociocultural context or is associated with cultural values. Especially when one's behaviors are open to evaluation by generally recognized social norms, a specific set of self-conscious/social emotions (e.g., shame, pride, and guilt) are often elicited.

These emotions highlight and reinforce social rules and standards regarding one's behaviors and outcomes, even without the presence of someone else (Barrett, 1998). As self-conscious/social emotions direct children's attention to social standards in evaluating their behaviors, children learn to adjust their self-processes (physiological, cognitive, emotional, and behavioral processes) accordingly, illustrating the role of self-conscious/social emotions in self-regulation (Barrett, 2013).

The learned significance is the most straightforward example of socialization's influence on emotions. It is through social communication that children acquire the culturally specified lexicons to label their emotions (Campos et al., 2004). It is also through social communication that children receive approval and disapproval from other social partners for behaviors that are consistent or inconsistent with the cultural norms for emotions. Self-conscious/social emotions are considered to emerge through the triadic interactions between the child, event, and the other person, which add new meanings to children's existing emotions and generate new members of the emotion family (Campos, Thein, & Owen, 2003). Thus the significance of a person-environment relationship can only be meaningfully interpreted in specific cultural context.

All these theoretical approaches as well as their supportive evidence point to the necessity to consider sociocultural influence in the study of emotions. Children in all cultures probably have the equal potential to display the same facial patterns, which could be utilized to serve communicative functions and hold emotional meanings. And emotions in all cultures function to facilitate people's adaption to their environment and are continuously being shaped through social interactions. But the ways in which the facial patterns, vocalizations, and motor behaviors are utilized, functions are achieved, and social interactions occur are all open to culture-specific socialization influences, which can be similar and different across cultures. Such

influences may involve the culture-specific structures, functions, expectations, quantitative and temporal patterns of emotions.

However, although emotions cannot be interpreted fully without considering the sociocultural context in which they occur, scientific knowledge about children's socioemotional development is still largely based on North American samples, which should not be directly generalized to other cultures without close scrutiny. It is important to compare children from different cultures in order to understand both the universality and culture-specificity of emotion processes. And such investigations require examining emotions' functions and meanings as informed by the experiencing individual's particular sociocultural background. Halberstadt and Lozada (2011) propose five overarching cultural frameworks to be considered in cross-cultural research on emotions: (1) collectivistic versus individualistic orientation, (2) structure of power (or acceptance for inequality) in family and society, (3) children's position in family and society, (4) the time, contents, and methods that different cultures choose to teach children about the culture's socioemotional aspects, and (5) cultural evaluation of emotions. Next, I will do a general review about the cultural differences between Chinese and American cultures in socioemotional responses and development to illustrate the theoretical and practical value of comparing children from these two cultures.

Comparison between Chinese and American cultures on the socialization of emotion.

A collectivistic versus individualistic orientation is reflected in the culture's view about the relationship between one individual and the rest of the society (Markus & Kitayama, 1991; Kitayama & Markus, 1994). Although it is important to realize that no culture is completely collectivistic or completely individualistic, cultures vary greatly on the extent to which they show each of these orientations. Collectivism entails a view of individuals as closely

interconnected with others, with individuals defining themselves in terms of their roles and relationships with others. One's characteristics are malleable to change to fit others' expectations and sociocultural norms, and it is more important to maintain harmony with others than to display one's own individuality and strengths. In keeping with this, emotions should promote, maintain, or defend social harmony, rather than serving to define the self as unique, capable, or special. Emotions should be carefully filtered through sociocultural norms before being openly expressed.

Individualism views individuals as unique entities, whose characteristics are internal and separate from the social context. It is acceptable from this perspective for emotions to serve personal goals and to promote, maintain, or defend one's individuality. Sociocultural expectations and maintaining harmony are not as important as fulfilling one's personal wellbeing.

Generally, Chinese and American cultures are considered typical representatives of collectivism and individualism, respectively. As reflected in themes in their descriptions of their rearing strategies, Chinese mothers emphasized teaching children about how to relate harmoniously with others; whereas, American mothers emphasized instilling self-confidence and self-assertion in children (Chao, 1995). As reflected in children's socioemotional characteristics, facing the conflict between individual and group benefits (a child's opportunity to join a contest versus the group's chance to win the contest), Chinese school children tended to sacrifice individual needs in order to benefit the group; whereas, American school children tended to choose the opposite (Fu, Xu, Cameron, Heyman, & Lee, 2007). The different orientations toward collectivism and individualism are quite obvious between Chinese and Americans.

The two cultures also contrast with each other in their view toward authority and inequality in social relationships. Confucianism is an important cultural root of Chinese culture,

which emphasizes that clear societal hierarchy and absolute obedience to higher ranks is the key to the prosperity of societies, families, and individuals (Chan, 1969). These hierarchical relationships include the superiority of the ruler, the father, and the husband to the ruled, the child, and the wife. Expectations inside families include fathers being righteous, mothers being devoted, and children demonstrating filial piety. Although contemporary Chinese culture is much more diverse than before, Confucian principles are still widely adopted in educating young children. In contrast, the spirit of American culture is freedom and equality. Democratic ideas are advocated and hierarchical boundaries are much more permeable (Halberstadt & Lozada, 2011). In keeping with these contrasting cultural beliefs, Chinese mothers are more directive, pragmatic, and didactic in their conversations with young children, highlighting the rules of expected behaviors (Wang, 2006); whereas, American mothers are more elaborative and respectful in their conversations, inviting children to express themselves freely, and validating children's own ideas and feelings. In young children's free storytelling, compared to their American counterparts, Chinese children introduced more authority figures and instances in which they consulted with and received approval or disapproval from authority figures (Wang & Leichtman, 2000).

Consistent with the abovementioned cultural frameworks about collectivism versus individualism and acceptance for unequal powers, children's position in traditional Chinese and American cultures also differs. According to Confucianism, expectations for children include "obeying and honoring one's parents, . . . and in general conducting oneself so as to bring honor and not disgrace to the family name" (Ho, 1994, p. 287). Thus, traditional Chinese culture emphasizes children's role in inheriting and transmitting both the material and spiritual wealth of the family, so that not only the children, but also the following generations will benefit, and the family will excel continuously. Such a mission benefits the whole family, across generations,

rather than any one individual. Children should work hard to assimilate all that parents give, while the parents should also strive to pass down everything that they value.

In contrast, American culture focuses more on the children's individual desires and inherent value, which are separate from the parents' expectations (Halberstadt & Lozada, 2011). Thus, parents may try to facilitate their children's achievement of positive outcomes, but they value and try to foster the individual desires and characteristics shown by their children, such that children are in more control of their own destinies.

Research supports this distinction between the roles of children in Chinese versus American cultures. American children were observed to proactively request, refuse, or negotiate with their parents about activities when they were as young as 3 and 4 years old (e.g., Kuczynski & Kochanska, 1990). In contrast, when Chinese school-aged children and their parents were interviewed about how children's responsibilities were assigned at home, child-initiated negotiations were considered rare and unacceptable (Bowes, Chen, Li, & Li, 2004). In one cross-cultural study with young adolescents in China and America, American children not only had more autonomy in decision-making, but their autonomy also increased much more significantly with development than that of Chinese children (Qin, Pomerantz, & Wang, 2009). Children's position in families and society is more subordinate to group benefit and authority figures in traditional Chinese culture and more independent and equal with others in American culture.

The two cultures also differ in their beliefs about appropriate timing, content, and methods for helping children develop socioemotional competence. According to Ho's earlier reviews of Chinese socialization patterns (1986, 1989), infancy and the preschool years were considered the age of innocence. Children were not expected to understand and confirm many sociocultural norms and parenting was characterized by leniency and indulgence. Traditionally,

young children in China were more attended to for their physical needs than affective needs (Ho, 1989), although prosocial behaviors such as sharing and helping were promoted and antisocial behaviors such as aggression were negatively sanctioned across all ages (Cheah & Rubin, 2003; Ho, 1989). The age of understanding did not come until children started formal schooling around 6 years old, when they were expected to understand sociocultural rules and to behave accordingly. Parents became strict and harsh in disciplining their children at that time.

Although American parents also consider very young children to be socioemotionally immature, they believe in even young children's capacity to increase their socioemotional competence with parents' scaffolding (Halberstadt & Lozada, 2011). American parents focus more on children's formative readiness for different socioemotional skills (Cheah & Rubin, 2003) and start scaffolding children's emotion conversation and self-construction beginning in early childhood (Wang, 2001, 2006). American preschoolers were expected to develop sufficient skills in regulating their emotions and behaviors to meet socialization requirements (Kopp, 2009).

Traditional Chinese socialization patterns endorse a hierarchical, "top-down" approach in which parents instruct, direct, and provide clear guidelines for children to follow. American parents put more emphasis on mutual participation of parents and children and purposeful modeling. Thus, when teaching their 4-year-olds about appropriate and inappropriate behaviors, Chinese mothers often referred to external standards, such as the authority figures, the media characteristics, quotes from the classics, lessons from the past, or other well-behaved children (Wang, Bernas, & Eberhard, 2008). American parents were more likely to consider children's internal characteristics (dispositional and developmental factors) (Cheah & Rubin, 2003) and to follow the child's lead and elaborate on children's statements (Wang, 2001, 2006). While the authoritative parenting style was most beneficial in American cultures, with its emphasis on

being accepting, responsive, and respectful with the children, a specific guan/training style combining high expectation, control, involvement, and love was more prevalent among the Chinese (Lieber, Fung, & Leung, 2006; Wu et al., 2002; Xu et al., 2005).

As for the value of emotions, traditional Chinese culture considers emotions to be disruptive or insignificant; whereas, American culture views them as an integral part of being human. For example, when interviewed about child rearing themes, about 40 percent of American mothers mentioned the importance of helping children understand, identify, and label their own feelings as part of their self-identity, whereas no Chinese mothers did that (Chao, 1995). Cognitive and academic development is more important than socioemotional development among the Chinese (Bowes, Chen, Li, & Li, 2004; Rao, McHale, & Pearson, 2003). More balanced and restrained emotional activities were considered good for both physical and mental health in China, while congruence between inner feelings and outer expressions were considered important for Americans' wellbeing (Chen & Swartzman, 2001; Gross & John, 2003). Dominant negative emotions such as anger are especially unwelcome among the Chinese because they disrupt social harmony (Markus & Kitayama, 1991). Positive emotions are highly valued among Americans, as they are consistent with individuals' pursuit of happiness (Halberstadt & Lozada, 2011). Both cultures emphasize that emotional experiences and expressions should be properly managed, but Chinese culture is more accepting of other-oriented emotions (e.g., sympathy, shame) than self-promoting emotions; whereas, American culture is more accepting of emotions communicating individual needs and attributes (e.g., anger, frustration, pride) in comparison to Chinese culture (Markus & Kitayama, 1991). Thus the value of emotions as a whole and the specific values of particular emotions differ between Chinese and American cultures.

However, globalization, immigration, and socioeconomic development have brought changes in both Chinese and American societies. In China, Confucianism was attacked during Cultural Revolution for the purpose of destratification, and many traditional doctrines were abandoned for a while (Song, 2009). Ever since the government's implementation of the one-child policy in 1979, only children have become more and more universal in China, especially in urban families (Huang, 2009). Chinese families have become unprecedentedly child-centered. Rapid urbanization and globalization have exposed the younger generation in China to Western culture more and more, such that they are more likely to favor democratic ideas and insist on individual opinions (Swader, 2008). As research reflects, a decrease in traditionalism and an increase in modernity are prevalent among contemporary Chinese (Yang, 1996). In his comprehensive analysis on Chinese psychological responses to modernization, Yang (1998) summarized that "traditionalistic conservatism", "wholesale Westernization", as well as other transient patterns may co-exist for a long time, including "transitional learning as essentials" (Western learning for practical applications), "creative cultural transformation" (selectively modify traditional patterns to benefit modern life), "rational selection for best combination" (combining the valued aspects of Chinese and Western cultures and discarding the devalued ones from both), and "industrial means of production as essentials" (selectively applying and modifying Western patterns to serve Chinese society). Similarly, American's individualism has been found to diverge into a soft and a hard type between the upper and lower classes (Kusserow, 2004). Soft individualists adopt more of a wellbeing approach, providing children with a comfortable and rich environment for them to flourish with their unique potentials. Hard individualists adopt more of a risk avoidance style, providing children a tough and demanding environment for them to become self-assertive and self-reliant. When the parental guan/training

style from Confucianism was examined with U.S., Chinese, and Pakistani college students, the construct showed similar meaning and socialization functions in all three cultures in predicting children's self-esteem and life satisfaction (Stewart, Bond, Kennard, Ho, & Zaman, 2002).

Considering the ever-growing changes and exchanges within and between China and America, it is important to explore the extent to which today's Chinese and American children resemble and differ from each other in their socioemotional functioning.

Summary of Theories and Research on Emotions

After reviewing the DET, functionalist, and DS approaches and relevant empirical evidence, some conclusions can be drawn that have important implications for the proposed research and its operationalization. Facial displays are certainly important indicators of emotions as suggested by all three theories and empirical evidence. But they are not sufficient evidence for specific, discrete emotions. Rather, in order to assess emotion, vocal, bodily, and contextual indicators are crucial as well. Both the functionalist and DS researchers conceptualize emotions as unfolding processes during significant person-environment interactions, which are context-specific, dynamic, and involve multiple participating processes. This is the more theoretically comprehensive, ecological, and empirically validated definition of emotion that I will adopt in my study. I will incorporate multiple indicators of emotional responses and investigate their unfolding processes in relation to the changes in contextual parameters. These are critical to understanding the dynamic nature and functions served by emotions as they occur in bidirectional person-environment transactions. Additionally, both the regulation of and by other nonemotional processes are inherent in the operation of emotions. My investigation of children's behavioral strategies and their relationships with emotional responses is informed by and will contribute to this line of research. Last but not least, sociocultural influence on emotions is

recognized in all three theories and they pointed out different aspects of sociocultural influence on emotions, including culture-specific display rules, functions, and qualities of emotions. Comparisons of the dynamic analysis of emotion displays and behaviors in context and of Chinese and American children should reveal culture-specific and culture-general displays and gradients of emotions. Moreover, by examining the dynamic relationship between children's emotional responses, overt behaviors, and outcomes in the context, inferences can be made about the culture-specific functions of emotions in those contexts.

Before proposing my actual studies, I will review the socioemotional development during preschool years to demonstrate the typical characteristics and changes during this developmental period as well as the important cascading effect on future development. More specific reviews of these contents and presentation of empirical evidence will be done in the sections of my actual studies.

Socioemotional Development during the Preschool Years

The preschool period is considered an important transition point in China, America, as well as many other countries. One common Chinese saying is that you can tell about a person's adulthood from who he/she is at the age of three. Our earliest explicit memories about ourselves usually date back to our preschool years, when we have overcome the period of infantile amnesia (Berk, 2012). Longitudinal research found that preschool socioemotional characteristics had long-term impact on self-perceptions and global self-worth into early adulthood (Hotulainen & Lappalainen, 2011). Preschoolers' developmental progress in all domains allows them to demonstrate more regularity, competence, and complexity in their interactions with the surrounding world. Correspondingly, they are exposed to more demanding social expectations. Ever since toddlerhood, parents began imposing various socialization rules to regulate children's

behaviors concerning safety, property, and daily routines (Lagattuta, 2005). Children often start preschool at around 3 years of age, and important nonfamily social relationships with peers and teachers begin to be established. Both variety and constraints on children's activities increase. Through their expanded interactions with the social and nonsocial environment, they receive more diverse and complex feedback under new circumstances and from new people. As children apply and refine their extant skills across different settings, new socioemotional skills are also developed.

Among the socioemotional progress observed during the preschool years, four representative aspects are particularly relevant to the proposed studies. These include (1) synergic development of self-awareness, other awareness, and social awareness; (2) progress in self-conscious/social emotions and emotion languages; (3) better effortful control over cognitions, emotions, and behaviors; and (4) increased flexibility and an increased repertoire of strategies for regulating emotions and behaviors in response to different contextual demands.

As development occurs in continuous person-environment interactions, children's understanding about themselves, others, and the social and nonsocial worlds go hand-in-hand (Wang & Barrett, 2013). Throughout toddlerhood and the preschool years, children form an increasingly coherent set of ideas about how mental activities occur, the so-called "theory of mind" (Berk, 2012). Preschoolers are increasingly able to talk about the mental states of themselves and others (Harter, 2006). This ability to consider others' mind and the diversity in people's beliefs is associated with children's moral and prosocial development (Astington, 2003). Three-year-olds were found to consider it morally wrong to hurt others because it was unfair to the others' wellbeing (Wainryb, Brehl, & Matwin, 2005). They considered both conventional and moral rules as important guidance for their behaviors. Three-year-olds also recognized that

people may conform to rules they do not understand or with which they do not agree (Kalish, 1998). Thus, even three year olds have surprisingly complex knowledge about self, others, and the rules of society.

Along with the progress in children's self, other, and social understandings, children's emotions also go through enormous development. More diverse emotional responses can be elicited by the same event and more events are able to elicit emotional responses. For example, the instruction "please wait to have the cookie until dinner is over" makes no sense to a newborn baby, but can elicit joyful expectation, angry protesting, or sad whining from preschoolers.

The appreciation of social rules and behavioral standards further facilitates the development of children's self-conscious/social emotions, which help children anticipate and respond to their behavioral outcomes according to socioculturally constructed standards (Barrett, 1998; Thompson, Meyer, & McGinley, 2006). These emotions not only serve social communication functions comparable to other emotions in signaling others about emotion-relevant information or channeling social interactions, but they also involve the consideration of how one's behaviors would be perceived by a real or imagined others in relation to evaluative standards (Barrett, 1998). For example, shame occurs when somebody feels his/her action has caused disappointment in others because of his/her failure to meet expectations. Guilt occurs when somebody feels his/her action has caused loss, harm, or sorrow in others. Thus the emergence and functioning of these emotions rely on children's consideration of self, others, and social standards. As research identified, self-conscious/social emotions begin to develop during toddlerhood and represent important socioemotional milestones during preschool years (Saarni, Campos, Camras, & Witherington, 2006). Preschoolers' language development also allows them

to use culturally constructed emotion labels to communicate about their diverse emotions (Berk, 2012). Thus, preschoolers have become more conscious and verbal with their emotions.

Another important development related to preschooler's socioemotional development is children's effortful control – the ability to appropriately inhibit or sustain attention, emotion, and behavior to meet contextual demands (Kochanska, Murray, & Harlan, 2000; Rothbart & Bates, 2006; Spinrad, Eisenberg & Gaertner, 2007). Throughout early childhood, children's conscious control over attention improves, enabling them to become less distractible and better at suppressing responses to irrelevant distractors (Colombo & Cheatham, 2006). And children become less reliant on adults' support or supervision in regulating their attention, emotion displays, and behaviors according to whether they are allowed or prohibited by the mothers (Cole, 1986; Deák, Walden, Kaiser, & Lewis, 2008; Kochanska & Aksan, 1995). Children's compliance was found to grow continuously throughout the first four years of life and children were better at inhibiting desired behaviors than sustaining unpleasant behaviors (Kochanska, Coy, & Murray, 2001). These developments make it possible for preschoolers to stay focused in structured school settings, follow teachers' instructions, and exhibit appropriate behaviors across a variety of situations. When followed from toddlerhood to preschool years, children became less readily to express anger and more quickly to use regulatory strategies when they were required to wait in front of an attractive gift (Cole et al., 2011). Preschoolers with better effortful control were also found to be less likely to express immediate verbal/gestural indicators of disappointment upon receiving a disappointing gift (Liew, Eisenberg, & Reiser, 2004). Such preschoolers were further rated as socially competent and well-adjusted by parents, teachers, and peers. Thus, children's volitional control over their cognitive, emotional, and behavioral

processes shows great progress during the preschool years, laying a solid foundation for their future ability to follow cultural norms.

Children's explicit awareness and flexible use of regulatory strategies across various situations were also found to emerge in preschool years. For example, in one study, 3- and 4-year-olds were interviewed about what puppets should do when the puppets felt mad, sad, or scared and needed to stop the negative feelings (Dennis & Kelemen, 2009). Preschoolers this young were already able to evaluate cognitive and behavioral distractions (e.g., look at another pleasantly attractive picture, play with another toy) and repairing behaviors (e.g., turn off the scaring TV program) as more effective in decreasing negative emotions than strategies such as rumination, venting, or calling the mother. Additionally, these children were aware about the different levels of effectiveness of different strategies for different emotions. For example, they considered problem-focused repair as most effective for anger regulation, whereas behavioral distraction was most effective for regulating sadness and fear. In another similar study, both 3- and 4-year-olds generated and recognized similar numbers of regulatory strategies toward sadness, but 4-year-olds showed even better understanding about regulatory strategies toward anger (Cole, Dennis, Smith-Simon, & Cohen, 2009). Children's superior understanding of regulatory strategies further predicted children's better self-regulation skills in a challenging task (to open a locked box), including better persistence, more attempts of appropriate alternatives, and less disruptive behaviors (e.g., cursing or trying to break the box). In one longitudinal study, children were observed in the delay of gratification task for four times between 18 months to 48 months (Cole et al., 2011). Although anger expression and attention distraction were observed at all ages, it was not until 36 months that children exhibited distraction before they expressed anger and their anger was briefer than before. Additionally, although the amount that children

solicited help from mothers was equivalent at 18 and 48 months, preschoolers' bids became less angry with age. In another similar longitudinal study using the delay of gratification task with boys from low-income families, children displayed less emotion-focused strategies (e.g., self-soothing, comfort seeking) but more problem-focused strategies (e.g., distract oneself by actively engaging in other activities) as they grew from 2 to 4 years old (Supplee, Skuban, Trentacosta, Shaw, & Stoltz, 2011). Thus, preschoolers are armed with broadening repertoires, and increasing flexibility and maturity in their understanding and use of regulatory behaviors as they get older, showing great improvement by 3 years of age (the age studied in the present studies). As a result, preschoolers are in a position to modify their emotions and regulatory behaviors based on cultural beliefs about appropriate behavior for that context.

Now, after reviewing the theories and research on emotion and emotion regulation from a socioculture-specific and developmental perspective, I will describe three studies that are planned to compare Chinese and American preschoolers emotional responses and regulatory behaviors in two challenging tasks, as well as the temporal relationship between children's emotional responses and regulatory behaviors. The first two studies will help me understand the cultural and contextual specificities involved in children's emotional response and regulatory behaviors. The third study will help me clarify the processes of regulation by emotion and regulation of emotion as well as their cultural and contextual specificities.

CHAPTER 2 – STUDY 1: DIFFERENCES BETWEEN AMERICAN AND CHINESE PRESCHOOLERS IN EMOTIONAL RESPONSES TO RESISTANCE TO TEMPTATION AND STANDARD VIOLATION CONTEXTS

Introduction

As reviewed in Chapter 1, children become more knowledgeable about and more capable of volitionally controlling their emotional responses during the preschool years, and preschoolers' emotional responses become more sensitive to external sociocultural standards. Investigating preschoolers' emotional responses in situations affording attention to social rules can offer rich information about how social norms influence children's emotions and whether the influence varies across contexts and cultures. My first study is designed to answer these questions by exploring the similarities and differences between American and Chinese preschoolers' context-specific emotional responses.

Emotional reactions can be inferred from various physiological, psychological, and behavioral indices. Many extant studies only use one indicator to make inferences about individuals' emotions, which can lead to inconsistent results across studies using the same situation. Therefore, emotion researchers have been advocating for more ecological methods in the study of emotions, such as observing spontaneous responses, using multiple indicators, including time variables, and considering contextual factors as well as sociocultural backgrounds (Barrett, 2013; Camras & Shutter, 2010; Feldman, 2007; Russell, Bachorowski, & Fernández-Dols, 2003). Isolated use of single indicators may at best offer incomplete if not inaccurate information about emotions. For example, if facial expressions are the sole basis for inferences about emotions, inaccuracy may result because emotions may not always be displayed on the face, the entire pattern predicted may not be displayed, and/or expected emotional facial patterns

may appear in nonemotional or mismatched conditions (Camras, 1992; Russell, Bachorowski, & Fernández-Dols, 2003). People may use “emotional displays” instrumentally to affect social interaction processes, or even to pronounce “cheese.” Movements associated with particular emotions may also be used for other purposes. For example, furrowing of eyebrows, which is often considered part of the anger expression, is also associated with responses of interest, confusion, or even instrumental focusing of eyes on a hard-to-see object.

The tone of voice, which can reflect one’s activation level and valence of psychological states, has also been used to infer emotions (Russell et al., 2003). But its qualities can be flexibly adjusted depending on the purpose, context, or audience as vocalizations occur, such as shouting with excitement, anger, or in a surrounding with loud background noise. Among adults, laughs may be produced for a variety of reasons, including humor, anger, anxiety, interest, embarrassment, self-deprecation, or submission (Russell et al., 2003). Among young children, cries, laughs, sighs, and yawns are present early in life, but observers still have to rely on the context to infer about infants’ specific states (Bachorowski & Owren, 2002). From toddlerhood, children begin to use various symbolic gestures to express their emotions, such as drawing forefingers down their cheeks to express tears of sadness or tapping the chest with open palms to indicate fear (Vallotton, 2008). Bodily responses have been found to indicate both the quantity (intensity) and quality (specific emotions) of different emotions (Harald & Wallbott, 1998). But contextual information is indispensable in interpreting these responses in a meaningful way.

When examined in isolation, no one-to-one correspondence has been consistently found between a specific display and a particular emotion. When multimodal responses were examined jointly, research with infants and preschoolers consistently supported the functionalist’s view that face, voice, gestures, gazes, and regulatory behaviors were organized coherently and flexibly

to cope with challenge (Dennis, Cole, Wiggins, Cohen, & Zalewski, 2009; Weinberg & Tronick, 1994). Facial displays, vocalizations, and behaviors are all “fundamental expressive units” which are “concurrently and sequentially combined into larger affective configurations by an underlying motivational state or emotion” (Weinberg & Tronick, 1994, p. 1513). Although a child’s gazing, smiling, getting off the chair, and calling the mother are delivered through different modalities, their sequence and growing gradients meaningfully reflect the child’s consistent intention and increased efforts to get the mother’s attention. Thus, capturing emotional information from different modalities and interpreting their meanings in relation to one another helps present a more complete picture of children’s ongoing emotions.

Such an integrative perspective also applies to the relation among different emotions. For example, when preschoolers were exposed to frustrating challenges (e.g., toy in a locked box), anger-powered problem-solving efforts were found to fade into helpless distress after extended attempts to solve the challenge (Cole, Dennis, Smith-Simon, & Cohen, 2009). Thus multiple emotions may occur in the same context, and transitions from one emotion to another may happen swiftly as the person-environment relationship evolves. The temporal sequence of emotional responses, in relation to the child’s ongoing strivings and other contextual information, is needed to unpack the nature of emotion processes in ecologically valid ways. Based on abovementioned empirical suggestions, my operational definition of emotional responses in this study involves children’s facial, vocal, and bodily responses of happiness, sadness, and anger as they unfold in real time.

In the study of emotions, commonly used measures include the latency to the first emotional response, the frequency and duration of the emotional response throughout the observation, and the intensity of emotional responses (usually obtained through a global rating or

scored based on the number of facial regions with codable emotional movements) (e.g., Buss & Goldsmith, 1998; Calkins, Dedmon, Gill, Lomax, & Johnson, 2002; Kochanska, Coy, Tjebkes, & Husarek, 1998). However, the procedural temporal characteristics of emotional response have gained increasing research attention among the researchers (Halberstadt & Parker, 2007) and more fine-grained time-stamped measures (such as the rate per minute of emotions, the mean duration of one incidence of an emotional event) have been used to delineate the real time sequences of emotions (e.g., Dondi, et al., 2007). In the current study, by examining facial, vocal, and bodily emotional responses in real time, all of the abovementioned global and temporal measures of emotions could be obtained and chosen for analyses. Additionally, both the quantitative (intensity) and qualitative (emotion-specificity) information from the facial, vocal, and bodily indicators could be jointly considered to delineate children's emotional processes.

As different contexts have different resources and rules that afford, constrain, and inform children's activities, their influence on children's emotional responses are different. More specifically, different contexts have different potentials to elicit, to support the functioning, and to channel the trajectories of children's various emotions. For example, when toddlers were observed during three events predicted to elicit anger, anger was found to have the highest frequency, longest duration, and greatest proportion of time in a toy removal episode, followed by a still-face task in which the mother was unresponsive to the child's overtures, and a resistance to temptation task (Feldman, Dollberg, & Nadam, 2011). Thus, although all three contexts were considered anger-inducing, there was systematic ordering of degree of observed anger in the three contexts. Furthermore, even emotional reactions to resistance to temptation/delay of gratification paradigms varied in relation to specific parameters of the context: Preschoolers expressed more happiness than anger or sadness when they were required

to wait before playing with a desired toy, but expressed more anger and sadness when the desired toy was in a locked-box (Dennis, Cole, Wiggins, Cohen, & Zalewski, 2009).

The resistance to temptation task has been widely studied with young children because the ability to inhibit immediate desires and wait for long-term goals is highly valued in most cultures and is needed in order for children to successfully adapt to preschool and school (Cole et al., 2011). In both China and U.S., young children's performance in resisting immediate temptation has an enduring influence on their later academic, social, and psychological functioning (Chen, Zhang, Chen, & Li, 2012; Eigsti et al., 2006). Despite children's increased understanding of rules and broader strategies to cope with emotions, resisting temptation is still challenging for preschoolers as their internalization of rules and utilization of strategies are still developing. Conflict between the desire for the temptation object and the desire to meet social expectation is emotion-eliciting and children's emotional responses can reflect how much effect social rules have on them.

Resistance to temptation typically is initiated by an adult's asking or telling the child to refrain from touching or interacting with the temptation object, so the child needs to inhibit a desired response in order to follow a rule explicitly stated by a socialization agent. Compared to obeying such an explicit prohibition of a desired response, children were found to have more difficulty with rules to sustain unpleasant behaviors (Kochanska, Coy, & Murray, 2001; Kochanska, Tjebkes, & Fortnan, 1998).

One socioculturally sensitive task pertinent to this latter ability is the "mishap" task, in which children are led to believe that they have caused damage to an adult's toy, in violation of a social standard (Barrett, Zahn-Waxler, & Cole, 1993). The implicit social expectation in this context is to feel bad about one's "mistake" and take responsibility to repair the mishap.

Different types of responses have been observed from children in this task, including more anxious, self-conscious, shame-relevant avoidance versus more problem-centered, guilt-relevant, acknowledgement of the wrongdoing and repair of the object (Barrett, Zahn-Waxler, & Cole, 1993; Barrett, 2005). Generally, young children's increased negative emotion, as well as their self-conscious behavior and body tension in this task were found, as expected, to have long-term implications for their internalization of rules and moral development (Kochanska, Gross, Lin, & Nichols, 2002). Thus, both the resistance to temptation and standard violation (mishap) tasks assess preschoolers' responses to important socialization rules, but each has its unique challenge and expectation – inhibit positive emotion and approach toward a desired object versus mobilize an adaptive response to negative emotion and correct a mistake. The current study exposed children to both challenges and explored how children's emotional responses unfold across the two tasks.

The Chinese and American preschoolers were compared on their emotional responses across the contexts, as sociocultural background influences one's emotional processes heavily and these two cultures have quite distinct socialization frameworks about children's emotions. It has long been observed that Americans are more reactive and expressive than Chinese in various emotion-eliciting contexts at different ages. For example, during neonatal testing procedures, American neonates were more active and fluctuated frequently between contentment and upset, showed more facial and bodily reddening, and adjusted their bodies more immediately following discomfort in comparison to Chinese newborns (Freedman & Freedman, 1969). In contrast, Chinese neonates were calmer, laying impassively as placed more often, and they showed fewer motor responses, and stopped crying sooner with or without soothing.

In studies with infants or preschoolers in emotion-eliciting tasks (e.g., anger-eliciting arm-restraint, fear-eliciting growling gorilla), Chinese children were less facially expressive than American children and had longer latency to cry (Camras et al., 1998; Camras, Bakeman, Chen, Norris, & Cain, 2006). However, when children were given a disappointing gift, although Chinese and American preschoolers' expression of negative emotions were equivalent, American school children (aged 7-8 years old) displayed much less negative emotion than Chinese peers (Garrett-Peters & Fox, 2007). American children also displayed more positive emotions than Chinese children's in this context. For the unexpected finding that Chinese school children were more expressive of negative emotions, the researchers argued that masking disappointment with positive emotions might be a more explicit social norm among North Americans. Culture-specific emphasis on certain norms and emotion display rules may lead to flexible variations in children's emotional responses in context. Thus, more research is needed to clarify how context-specific rules elicit emotional responses similarly or differently from children with different sociocultural backgrounds.

To resist temptation as required and to take responsibility in correcting one's mistake are both important socialization rules for young children to internalize. This study examined how Chinese and American preschoolers' emotional response patterns are influenced by these rules. One would expect American preschoolers to be generally more expressive than Chinese preschoolers, as reflected in shorter latencies, greater intensities, and longer durations of emotions, given the general finding that Chinese are less expressive than American children. I also anticipated that the emotional responses of children in both cultures would change with contextual demands: decreased happiness, increased anger and sadness in the temptation and mishap episodes, compared to introductory episodes. But whether American or Chinese

children's emotional responses would be more sensitive to these changing contexts or, particularly to the waiting and mishap episodes, was open for exploration. On the one hand, American children might display more fluctuations in their emotional responses because of their higher reactivity in general. On the other hand, Chinese children might be more reactive to the waiting/resistance to temptation and mishap contexts because their collectivistic culture puts higher emphasis on rule-abiding. Thus, group differences in either direction were possible and a clear directional hypothesis was not made.

Method

Participants

The sample includes 35 mainland Chinese (17 females) and 39 European American (19 females) preschoolers aged 3-3.5 years old. Chinese participants were recruited from two childcare centers in a medium-sized city in southern China. American participants were recruited by calling families who had placed birth announcements in a local newspaper in a medium-sized city in the Rocky Mountain area. Although average age was similar for the two groups ($M = 42.14$ months, $SD = 1.70$ months; and $M = 40.14$ months, $SD = .25$) for American and Chinese samples, respectively, a t -test indicated that there was a significant difference in age between these two groups, $t(56) = 5.94$, $p < .001$. Therefore, all analyses were performed with age as a covariate first. If age was not found to be a significant predictor, then it would be removed from the final analyses, to increase power. Families in the two countries were comparable in Socioeconomic Status (SES), and were mostly well-educated middle class families. SES was computed for both samples based on whichever parent had the highest level job, using the method of Ganzeboom, Graaf, and Treiman (1992), which has been validated across a variety of countries. For the American sample, the average SES level was $M = 62.84$, $SD = 12.80$,

minimum and maximum = 34 and 88. In the Chinese sample, average SES level was $M = 64.03$, $SD = 11.19$, minimum and maximum = 53 and 88. A t-test indicated no significant difference between samples in SES, $t(59) = -.388$, $p = .70$, so SES was not included as a covariate in analyses.

Procedure

Observations were conducted by a trained female experimenter and videotaped in a private room for each child, in the presence of a familiar adult, who was occupied with questionnaires in the corner of the room. The private room for Chinese children was located in their childcare center, and they were observed with a familiar teacher present. American children were observed in a university playroom with their mothers present. Although the original design included a parent in both countries, this was impossible to carry out in China, as parents were unable to take off from work to be in the study. However, the familiar adults for both samples were there to help children feel comfortable throughout the study, and were not actually participants in the tasks. They were asked to work on questionnaires and not to get involved in the observation tasks. If the child came up to them for help or communication, they were instructed to minimize their responses by saying something like, “I am busy. Try to play by yourself for a while.” If the adult became involved or instructed the child on how to behave, that child’s data were excluded from the study. Each observation lasted for 30-45 min and was composed of a free play, a resistance to temptation task, a standard violation (mishap) task, and a final free play.

Informed consents from the parents were obtained before each observation. When the child and the familiar adult entered the observation room, the familiar adult was first informed of the procedures and got seated in the corner of the room. The child and the experimenter were

seated in the center of the room at a small table, with the child facing a video camera. During the first *free play* (5 min), children were encouraged to play freely with a variety of toys the experimenter provided. Experimenters were instructed to follow children's lead and to respond positively to and establish rapport with them.

After the toys from the free play session were cleaned up, the *resistance to temptation task* was introduced. The experimenter showed the child an attractive mechanical toy robot and encouraged the child to play with it. After the child got engaged with the robot for 1-2 min, the experimenter suddenly "realized" that she had given the child "the other child's toy." Thus, she told the child that she would go get another toy for the child and asked the child not to touch the robot while she was away. Then the experimenter placed the robot at the other end of the table beyond the child's arm's reach and left the room. Children could easily see the robot, but in order for them to play with it, they needed to get up and go over to it. The task ended when the child touched the robot or had waited for 5 min, whichever happened sooner.

A *standard violation task* was introduced next. The experimenter came back with a clown rag doll with ambiguous gender. She introduced the doll as her favorite toy and showed the child many things that can be done with the doll. She asked the child to play with the doll and take good care of it when she took the "wrong" toy to "the other child." She then left the child playing with the clown rag doll, taking the robot from the room with her. The rag doll had been modified so that its arm/leg would fall off as the child played with it. After the child noticed that s/he had "broken" the doll, the experimenter remained out of the room for 2 minutes or until the child had stopped actively trying to fix the doll, whichever came later. Then, the experimenter returned and looked at the doll matter-of-factly without saying anything for a minute, after which she matter-of-factly stated that it looked like the clown's arm/leg came off and asked how the child thought

that happened. Next, she expressed mild disappointment that the arm/leg came off, saying that it was “too bad.” Finally, with a happy tone of voice she said that she was sure that the child did not break the doll, and she also was sure that she could fix it so that it would be as good as new. She played with the child with the free play toys until the child clearly was in a positive mood.

Coding of Emotions

Children’s facial, vocal, and bodily emotional responses pertaining to four categories: happiness, anger, sadness, and “other” were coded in real time from video records. The “other” code was used when the child was not displaying any emotion, or the emotion could not be categorized as happy, angry, or sad (e.g., if the child showed signs of surprise, fear, or disgust, or if it was unclear what emotion was being displayed). The codes were defined based on Izard’s Max facial coding system and extant studies (Barrett, 2005; Dennis, Cole, Wiggins, Cohen, & Zalewski, 2009) and further adapted to accommodate continuous real time coding and to involve culturally relevant examples. Table 1 summarizes facial, vocal, and behavioral indicators used to code happiness, anger, and sadness. The task conditions were also coded simultaneously to mark the changes among episodes of introduction of the toy robot, resistance to temptation, introduction of the clown rag doll, free play with the doll, and the mishap period after the doll’s arm/leg falls off until E debriefed the child.

The Noldus Observer XT 10.0 software package (Noldus Information Technology, 2010) was used for coding. The Observer software allows the researcher to watch the video and directly enter, in a computerized system, multiple categories of codes and the second they occur. The emotional responses and task conditions were given short, concise titles to assist the coding process in the Noldus system. To facilitate continuous coding and later sequential analysis on durations of emotional responses, all categories and subcategories within each class of responses

(e.g., emotion) were considered as mutually exclusive and exhaustive events, so they could not occur simultaneously. For example, the child could not be coded as having a happy and angry face at the same time and could not be coded as having a happy voice and a happy face at the same time. Because children could, and often did show multiple signs of the same emotion at the same time, in order to make the codes mutually exclusive, the decision was made to code the emotional response at the highest level of intensity for that particular episode of that emotion. Bodily responses to emotion were considered higher in intensity than vocalizations, and vocalizations higher in intensity than facial movements given that their definitions involved more energetic responses and also often concurrent facial or other indicators of the emotion (e.g., laughter always includes a smile; in order for a body display to be considered happy in the coding system, it needed to be both high energy and accompanied by a smile; see Table 1). The change or end of each state event (e.g., an emotional response or a task condition) was marked by the entry of a new code.

A pilot study was first conducted with a subset of the videos (5 for Chinese children and 5 for American children) to test the feasibility of using the initial coding scheme in Noldus. The primary researcher and a trained research assistant, both of whom are fluent in both English and Chinese, independently coded each video. After coding each video, the two coders discussed their disagreements and remaining questions together with an emotion research expert. The coding scheme was further refined with added details, clarifications, decision rules, and examples to best capture the full range of emotional responses and individual variations.

The Chinese and American samples were independently coded by two trained coders whose native language was Chinese or English, respectively. The primary researcher coded 25% of the videos of each sample to calculate interrater reliability and continued to code randomly

selected cases to calculate drift reliability. As in the pilot study, disagreements or uncertainties between coders were resolved through consensus between the coders, the primary investigator, and the emotion research expert to create the final version of the coding for each video.

Reliability between the two main coders for each sample was calculated using Cohen's kappa, based on agreement throughout the observations (see Table 2). Due to equipment failure, the videos of one American boy and one Chinese boy were not codable, thus were not included in this study.

Table 1
Facial, Vocal, and Bodily Indicators for Coding Emotional Responses

Indicators	Emotion		
	Happiness	Anger	Sadness
Face	Mouth outer corners turned up above baseline.	Inner eyebrows go down and together. Mouth pressed tightly together but not turned down or mouth is square, rigid, and tense.	Oblique eyebrows (inner corner) raised and eyebrows curved down on outer sides (forehead may wrinkle). Mouth outer corners down turned and/or chin up (may look pouty).
Voice	Relatively high pitch with mobile contour. Giggling/Squealing with joy, laughing, or singing merrily. Manipulate sound in a goofy, silly, or funny way.	Heavy breathing above baseline. Tense, harsh, abrupt, and forceful tone of voice. Yelling, shouting, harsh screaming, or angry crying.	Whining, sad crying, moaning, high pitched with downward contour.
Body	Tense, excitable burst of movements or tense approaching behavior with happy face/voice. Jumping, clapping, stomping, or dancing with excitement.	Fidgety and tense body. Tapping table or other irritable non purposeful behaviors. Protesting (clenching fists, throwing or pushing away object). Slamming/hitting/biting objects or people.	Head down (not on soft object not for comfort seeking). Face in hands with other sad indicators prior or afterwards. Drained of energy. Hand on face while showing distress.

Table 2

Interrater Reliabilities of Emotional Responses

	Resistance to Temptation	Standard Violation
<i>Kappa</i> for American Sample	.70	.71
<i>Kappa</i> for Chinese Sample	.70	.72

Results

Task Conditions

Children's emotional responses were observed in four task conditions: (1) introduction of the temptation toy (toy robot), (2) resistance to temptation, (3) introduction of the mishap toy (clown rag doll), and (4) the mishap period after the doll's arm/leg falls off. The first introductory episode provided a pleasant baseline condition and the second introductory episode provided a pleasant recovery condition for children's emotional responses. The resistance to temptation and mishap episodes exposed children to the mildly stressful events under investigation. Thus, the four selected conditions provided changing contexts for children's emotional responses, with positive contexts preceding each context that is predicted to elicit negative emotion, enabling us to compare positive to negative contexts as well as to observe whether there was recovery from negative emotion elicitation.

Variable Derivation and Calculations

Several overall and condition-specific measures of happiness, anger, and sadness were derived from the Noldus system to be included in analyses. The overall measures included the latency of each emotion after the start of the whole observation and the mean duration per incidence of each emotion throughout the whole observation. The condition-specific measures of each emotion included the latency after the start of each selected task condition, mean duration of each emotion in each condition, and the rate per minute (RPM) of each emotional response in each condition.

Further, based on the RPM measure, composite intensity scores for happiness, anger, and sadness in each condition were created by giving weighted values to facial, vocal, and bodily indicators (1 for face, 2 for voice, and 3 for body). For example, to create a composite intensity score of happy responses in the resistance to temptation episode, the following scores in that episode were summed together: (1) RPM of happy face multiplied by 1; (2) RPM of happy voice multiplied by 2; and (3) RPM of happy body multiplied by 3. Then an overall intensity score for each emotion was created by averaging the intensity scores of each emotion across the selected task conditions. Table 3 presented the descriptive data for the overall measures of children's happiness, anger, and sadness.

Cultural Differences in Children's Overall Measures of Emotions

To examine whether American children are generally more emotionally expressive and reactive than Chinese children, a 2 (Culture) \times 2 (Gender) multivariate analysis of variance (MANCOVA) was conducted, with age as a covariate, to examine whether children from the two samples differ in the overall latency, mean duration, and intensity of their happiness, anger, and sadness. A significant main effect was obtained for Culture, $F(3, 68) = 3.89, p = .001, \text{partial } \eta^2 = .37$. Follow-up univariate analyses of variance (ANOVAs) indicated that children from the two samples differed significantly in their overall latencies and overall intensities of happiness and sadness: $F(1, 70) = 5.23, p = .03, \text{partial } \eta^2 = .07$ for happiness latency; $F(1, 70) = 11.52, p = .001, \text{partial } \eta^2 = .15$ for sadness latency; $F(1, 70) = 4.42, p = .04, \text{partial } \eta^2 = .06$ for happiness intensity; $F(1, 70) = 4.01, p = .049, \text{partial } \eta^2 = .06$ for sadness intensity. Referring to the results in Table 3, Chinese children had significantly longer latencies than American children in their overall expression of happiness and sadness; whereas American children's overall happiness and sadness showed significantly greater intensity than Chinese children's. Thus the

hypothesis that American children are generally more expressive than Chinese children was supported by American children's shorter latencies and greater intensities for happiness and sadness.

Table 3

Means and Standard Deviations for Overall Measures of Happiness, Anger, and Sadness

		Happiness			Anger			Sadness		
		Latency	Mean duration	Intensity	Latency	Mean duration	Intensity	Latency	Mean duration	Intensity
<i>N</i>		<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>
		(<i>SD</i>)	(<i>SD</i>)	(<i>SD</i>)	(<i>SD</i>)	(<i>SD</i>)	(<i>SD</i>)	(<i>SD</i>)	(<i>SD</i>)	(<i>SD</i>)
American										
Female	19	6.68	11	2.06	681.11	1	.13	462.05	2	.45
		(6.25)	(5)	(1.01)	(510.06)	(1)	(.18)	(484.10)	(2)	(.70)
Male	19	15.11	9	1.96	697.05	1	.25	629.42	1	.35
		(17.20)	(6)	(.74)	(452.73)	(2)	(.28)	(450.93)	(1)	(.46)
Total	38	10.89	10	2.01	689.08	1	.19	545.74	1	.40
		(13.46)	(5)	(.87)	(475.76)	(2)	(.24)	(469.17)	(2)	(.59)
Chinese										
Female	17	43.41	12	1.61	996.53	0	.10	1059.06	0	.02
		(130.18)	(12)	(1.52)	(290.93)	(0)	(.19)	(318.07)	(0)	(.03)
Male	17	90.47	4	1.31	736.71	1	.17	931.99	5	.11
		(205.02)	(4)	(1.17)	(397.61)	(1)	(.29)	(391.86)	(19)	(.34)
Total	34	66.94	8	1.46	866.62	1	.14	995.47	2	.07
		(170.78)	(10)	(1.34)	(367.53)	(1)	(.24)	(357.31)	(13)	(.24)

Note: Both latency and mean duration were derived across the whole observation and measured in seconds. Intensity scores were first calculated by multiplying rate per minute by the corresponding intensity weighting of emotional responses (face=1, voice=2, or body=3) and then averaged across the different task conditions.

Cultural Differences in Changes of Children's Context-Specific Measures of Emotions

To examine how children's emotional responses change over the four different task conditions (introduction of the toy robot, resistance to temptation, introduction of the clown rag doll, and the mishap period after the doll's arm/leg falls off) and whether American and Chinese children differ in their patterns of change, a series of within-subject MANCOVAs were conducted. In each analysis, Culture and Gender were the between-subject factors, the task condition (Episode) was the within-subject factor, and age was a continuous covariate. The mean duration, intensity, and latency of each emotion in each task condition were the variables measured repeatedly that were analyzed in separate MANCOVAs. If a child did not show a specific emotion during a particular task condition, the child received a score of zero for both the mean duration and intensity for that emotion in that episode, and the latency for the context-specific emotion was scored as the total duration of that task condition (the maximum amount of time available to the child to show that emotion in that condition). However, because the total duration of the task conditions were not equal among different children, especially for the resistance to temptation episode in which the duration of condition depended on the child's ability to wait, the context-specific latencies were transformed from absolute duration into percentage of time in each task condition. More specifically, each latency percentage score used in the within-subject MANCOVAs represented the percentage of time that had passed before the child showed that emotion in that particular context.

Changes in mean durations of each context-specific emotion. No significant differences across Contexts, Cultures, or Genders were found for the mean duration of emotions. The duration of each emotion was similar across children and task conditions.

Context-specific changes in latency percentages of each emotion (percentage of time elapsing before the emotion is shown). In the within-subjects MANCOVA on children's latency percentage of each emotion across the four task conditions, both Culture and Gender were between-subjects variables, and Age was the covariate. Gender did not show any significant effects or interactions, and thus was removed from the final analyses. Differences between the American and Chinese children were evidenced by a significant main effect of Culture, $F(3, 65) = 4.77, p = .005, \text{partial } \eta^2 = .18$, and a significant Episode \times Culture interaction, $F(9, 59) = 3.03, p = .005, \text{partial } \eta^2 = .32$. Follow-up ANOVAs indicated that the American and Chinese preschoolers differed significantly in their latency percentage scores of happiness across the four task conditions, $F(1, 67) = 11.92, p = .001, \text{partial } \eta^2 = .15$. This result is consistent with the abovementioned finding indicating that American children had a significantly shorter latency for happiness than the Chinese children throughout the observation.

Follow-up repeated measures ANCOVAs, with polynomial trend analyses for Episode revealed that children from the two samples had significantly different cubic trends across Episode in the latency percentage scores of their happiness, $F(1, 67) = 5.56, p = .02, \text{partial } \eta^2 = .08$; anger, $F(1, 67) = 4.99, p = .03, \text{partial } \eta^2 = .07$; and sadness $F(1, 67) = 5.12, p = .03, \text{partial } \eta^2 = .07$. As Figure 1 illustrates, American children had significantly shorter happiness latencies than Chinese children in all contexts. Both the American and Chinese preschoolers had shorter happiness latencies in the two pleasant episodes when they were introduced to new toys and had longer happiness latencies in the two challenging episodes when they were not allowed to touch the toy robot or when the clown doll was broken. However, Chinese children's happiness latency showed a greater cubic trend than the American children's, indicating greater

changes in Chinese children's happiness latencies across the different contexts, which differed from American children's generally shorter happiness latencies across contexts.

The American children's anger latencies also showed a cubic trend across the contexts, with longer anger latencies in the pleasant episodes and shorter anger latencies in the challenging episodes. However, the Chinese children's anger latencies were longer in the two earlier task conditions – when they were introduced the toy robot and when they were forbidden to touch the toy, but became increasingly shorter during the two later task conditions – when the clown doll was introduced to them and when the doll was broken.

Children from both samples showed cubic trends in their sadness latencies across the four contexts, with longer sadness latencies in the pleasant episodes and shorter sadness latencies in the challenging episodes. However, the American children's cubic trend was significantly greater than the Chinese children's, indicating American children's greater changes in sadness latencies across the contexts.

To further clarify the emotional latency findings in each culture, repeated measures ANOVAs, with pairwise within-subject contrasts, were conducted separately on the American and Chinese children's latency percentage scores of happiness, anger, and sadness. A significant main effect of Episode was obtained for both the American, $F(9, 29) = 11.80, p < .001, \text{partial } \eta^2 = .79$, and Chinese children, $F(9, 23) = 10.75, p < .001, \text{partial } \eta^2 = .81$. Follow-up within-subject contrasts indicated that Chinese children's happiness latency was significantly different between the introduction of the temptation toy and the context in which children were asked not to touch the temptation toy, $F(1, 31) = 34.16, p < .001, \text{partial } \eta^2 = .52$, between the resistance to temptation episode and the introduction of the second toy, $F(1, 31) = 19.18, p < .001, \text{partial } \eta^2 = .38$, and between the second introduction and the standard violation episode, $F(1, 31) = 30.72,$

$p < .001$, $partial \eta^2 = .50$. Chinese children's anger latency was significantly lower in the standard violation episode than the first introduction, $F(1, 31) = 5.73$, $p = .02$, $partial \eta^2 = .17$, the resistance to temptation, $F(1, 31) = 8.07$, $p = .008$, $partial \eta^2 = .21$, and the three previous episodes combined, $F(1, 31) = 7.22$, $p = .01$, $partial \eta^2 = .19$. However, there was no significant difference in Chinese children's sadness latency across the episodes.

American children's happiness latency showed a similar pattern to the Chinese children's: their happiness latency percentage score was significantly different between the introduction of the first toy and resistance to temptation, $F(1, 37) = 28.21$, $p < .001$, $partial \eta^2 = .43$, between the resistance to temptation episode and the introduction of the second toy, $F(1, 37) = 5.43$, $p = .03$, $partial \eta^2 = .19$, and between the second introduction and the standard violation episode, $F(1, 37) = 19.35$, $p < .001$, $partial \eta^2 = .34$. American children's anger latency increased significantly from the resistance to temptation episode to the introduction of the second toy, $F(1, 37) = 7.45$, $p = .01$, $partial \eta^2 = .17$, suggesting their recovery from the previous stress. Such a recovery was also identified with their sadness latency which increased significantly from the resistance to temptation episode to the introduction of the second toy, $F(1, 37) = 18.34$, $p < .001$, $partial \eta^2 = .33$. Additionally, their sadness latency decreased significantly from the second introduction to the standard violation episode, $F(1, 37) = 9.28$, $p = .004$, $partial \eta^2 = .20$, suggesting their reactivity to the second contextual challenge.

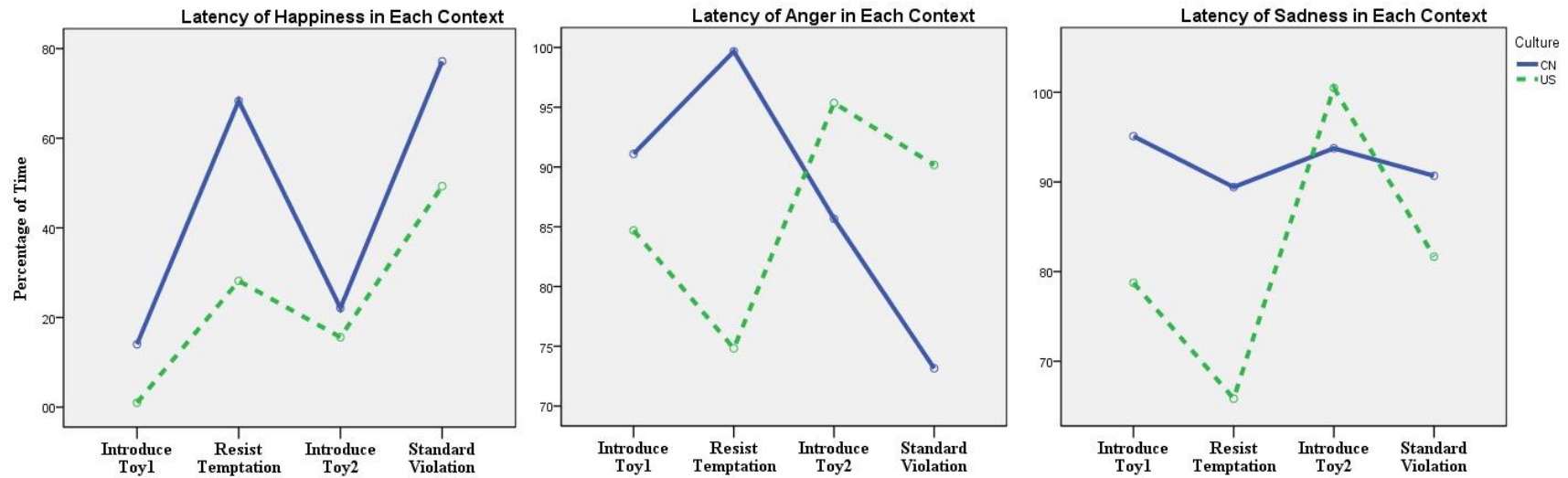


Figure 1. Changes in latency percentage of American and Chinese preschoolers' happiness, anger, and sadness across the four task conditions (introduction of the toy robot, resistance to temptation, introduction of the clown rag doll, and the mishap period after the doll's arm/leg falls off). Percentage of time = percentage of time that had passed in the context before the emotion occurred; CN = Chinese preschoolers; US = American preschoolers.

Context-specific changes in intensities of each emotion. In the within-subject MANCOVA on children's intensity of each emotion across the four task conditions, both Culture and Gender were entered as the between-subjects variable, and Age was entered as the covariate. Again, Gender did not show any significant effects or interactions, and thus was removed from the final analyses. Differences between the American and Chinese children were evidenced by a significant Episode \times Culture interaction, $F(9, 59) = 2.70, p = .011, \text{partial } \eta^2 = .29$.

Follow-up repeated measures ANCOVAs, with polynomial trend analyses for Episode revealed that children from the two samples had significantly different quadratic trends in their anger intensity, $F(1, 67) = 4.52, p = .04, \text{partial } \eta^2 = .06$, and significantly different cubic trends in their sadness intensity, $F(1, 67) = 3.59, p = .02, \text{partial } \eta^2 = .08$.

As Figure 2 illustrates, Chinese children's anger intensity showed a quadratic trend across the contexts, with low anger intensity in the first three episodes but significantly increased anger in the last episode when the clown doll was broken. In contrast, American children's anger intensity was low in the two pleasant episodes when they were introduced to new toys, higher when the clown doll was broken, and highest in the resistance to temptation episode.

American children's sadness intensity showed a very obvious cubic trend across the contexts, with lower anger intensity in the pleasant episodes and higher in the challenging episodes. Although Chinese children's sadness intensity also showed a similar trend, the change across context was very small.

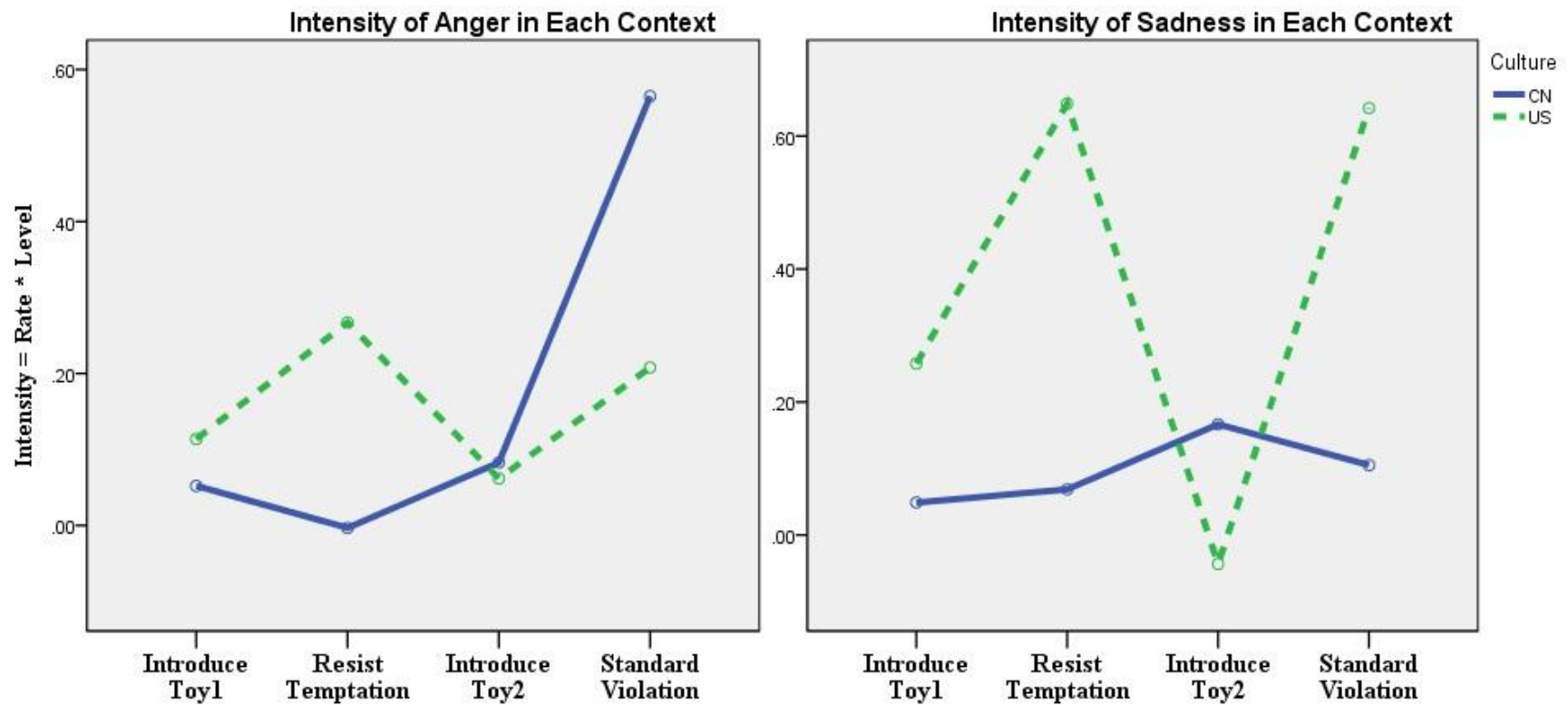


Figure 2. Changes in intensity of American and Chinese preschoolers' anger and sadness across the four task conditions (introduction of the toy robot, resistance to temptation, introduction of the clown rag doll, and the mishap period after the doll's arm/leg falls off). Intensity = Rate Per Minute \times Level of Responses (1 for facial responses, 2 for vocal responses, 3 for bodily responses); CN = Chinese preschoolers; US = American preschoolers.

To further clarify the emotional intensity findings in each culture, repeated measures ANOVAs were conducted separately on the American and Chinese children's intensity scores of happiness, anger, and sadness. A significant main effect of Episode was obtained for both the American, $F(9, 29) = 4.06, p = .002, \text{partial } \eta^2 = .56$, and Chinese children, $F(9, 23) = 3.96, p = .004, \text{partial } \eta^2 = .61$. Follow-up within-subject contrasts indicated that Chinese children's happiness intensity was significantly lower in the standard violation episode compared to the introduction of the first toy, $F(1, 31) = 32.10, p < .001, \text{partial } \eta^2 = .51$, the introduction of the second toy, $F(1, 31) = 11.22, p = .002, \text{partial } \eta^2 = .27$, and the three previous episodes combined, $F(1, 31) = 16.42, p < .001, \text{partial } \eta^2 = .35$. Chinese children's anger was significantly more intense in the standard violation episode than the first introduction, $F(1, 31) = 7.51, p = .01, \text{partial } \eta^2 = .20$, the resistance to temptation, $F(1, 31) = 7.72, p = .009, \text{partial } \eta^2 = .20$, and the second introduction, $F(1, 31) = 6.86, p = .01, \text{partial } \eta^2 = .18$. Similar to the findings on latency measures, there was no significant difference in Chinese children's sadness intensity across the episodes.

American children's happiness intensity was significantly different between the introduction of the first toy and the resistance to temptation, $F(1, 37) = 15.95, p < .001, \text{partial } \eta^2 = .30$, between the resistance to temptation episodes and the introduction of the second toy, $F(1, 37) = 10.58, p = .002, \text{partial } \eta^2 = .22$, and between the second introduction and the standard violation episodes, $F(1, 37) = 7.22, p = .01, \text{partial } \eta^2 = .16$. American children's anger became significantly more intense from the second introduction to the standard violation episode, $F(1, 37) = 4.84, p = .03, \text{partial } \eta^2 = .12$. Their sadness intensity decreased significantly from the resistance to temptation to the second introduction, $F(1, 37) = 8.19, p = .007, \text{partial } \eta^2 = .18$, but

increased significantly from the second introduction to the standard violation episode, $F(1, 37) = 10.87, p = .002, \text{partial } \eta^2 = .23$, suggesting their reactivity to the contextual changes.

Discussion

The first goal of the study was to examine whether American preschoolers were generally more emotionally responsive than Chinese preschoolers to two pleasant (introduction of two new toys) and two challenging (resistance to temptation and standard violation) contexts. Existing findings showed that American children were generally more emotionally expressive and responsive both in infancy and preschool years (Camras et al., 1998; Camras, Bakeman, Chen, Norris, & Cain, 2006; Freedman & Freedman, 1969; Garrett-Peters & Fox, 2007), except in situations involving highly culture-specific social rules, such as masking disappointment when given a gift among school-aged children (Garrett-Peters & Fox, 2007). Findings from the current study were largely consistent with the previous studies that across the different contexts, the American preschoolers showed shorter latencies and greater intensities in their happiness and sadness than the Chinese preschoolers. As reasoned previously by cross-cultural researchers (Markus & Kitayama, 1999; Matsumoto, 1989; Oyserman, Coon, & Kemmelmeier, 2002; Rothbaum & Rusk, 2011), in individualistic cultures which promote autonomy and independence – such as the US – the pursuit of personal happiness and even high-intensity happiness is a major goal. However, in collectivistic cultures which emphasize societal harmony, emotional calm and balance, as well as suppression of one's feelings are advocated. This may explain the greater expressiveness and responsiveness of American children's happiness and sadness in the current study.

Although no cross-cultural difference was identified in the general expressiveness and responsiveness of anger, the exploration of the second research question on temporal patterns of

emotions further clarified children's emotional profiles in these contexts and provided some unexpected findings about children's anger responses. The second research question focused on how contextual changes from introduction of the first toy, to resistance to temptation of the first toy, to introduction of the second toy, to the accidental standard violation/mishap of "breaking" the second toy generated changes in children's emotional responses. It was hypothesized that children's happy responses would be greater in the positive introductory episodes and less in the challenging resistance and mishap episodes; whereas their anger and sadness should show the opposite trajectory of being greater in the challenging contexts and less in the pleasant episodes.

Findings on children's happiness latency, sadness latency, as well as sadness intensity were fully consistent with this hypothesis that both American and Chinese children showed happiness sooner, but sadness slower and milder in the pleasant episodes and showed happiness later, but sadness sooner and more intense in the challenging episodes. According to the functionalist theory of emotions (Barrett, 2013; Barrett & Campos, 1987; Campos, Mumme, Kermoian, & Campos, 1994), happiness functions to maintain or expand ongoing goal-directed behaviors; whereas, sadness promotes relinquishing of unattainable outcomes. Children were encouraged to play with the new toys in the two pleasant introductory episodes, and their happiness facilitated their pursuit of play with those toys. However, the resistance to temptation and standard violation contexts both involved unattainable goals – a forbidden or irreparable toy – and sadness from realizing this discouraged children's further interaction with the toy. Both happiness and sadness served adaptive functions given the contextual expectations.

American children's anger latency and intensity also changed in response to contextual characteristics in the expected pattern – slower and less intense anger in the pleasant episodes versus sooner and more intense anger in the challenging episodes. Based on theoretical and

empirical evidence (Barrett, 2013; Dennis, Cole, Wiggins, Cohen, & Zalewski, 2009), anger occurs when challenging obstacles prevent one from reaching his/her goals and motivates one's attempt to overcome obstacles. In the current study, the American children's anger showed similar patterns to their sadness, in that it decreased in latency and increased in intensity in the face of challenge. This pattern is common in the literature (e.g., Lewis, Ramsay, & Sullivan, 2006); while one perceives that one may overcome the obstacle, anger is typical, but when one assumes that one cannot overcome the obstacle, sadness results (e.g., Cole, Dennis, Smith-Simon, & Cohen, 2009). The obstacles involved in the resistance to temptation and standard violation tasks generated anger and sadness similarly in the American children, fostering both the intention to overcome the obstacle and to give up worthless attempts.

Interestingly, the Chinese children's anger showed a quite different pattern, in that their anger was almost absent in the challenging resistance to temptation task, even less than the two pleasant introductory episodes. But their anger became much faster and more intense in the last standard violation episode, even before the toy broke. Although this pattern of anger response was unexpected based on the original hypothesis, there are at least two, potentially interrelated explanations for this observation.

First, compared to American children, Chinese children have been found to be more accepting of authority figures' rules and standards (Wang & Leichtman, 2000). Thus the experimenter's explicit rule of "do not touch the robot" might have caused the Chinese children to give up interacting with the focal toy completely, such that they no longer had the goal of playing with it or felt sadness instead of anger. Or, the clear rule might have led them to control expression of any anger they initially felt because adults had actively discouraged or at least not supported them in the past for displaying anger in such circumstances. In contrast, many

American children might have questioned and felt angry about the experimenter's denying them access to the toy, adding to the anger they felt at not being able to play with a desired toy.

The standard violation situation was different than the temptation task in that no explicit rule except for "taking good care of the clown doll" was provided. The broken toy might have triggered more frustration or anger from the Chinese children when they could not fix the toy, because their interdependent culture led them to be more concerned about the experimenter's feelings and/or reactions if they failed to take good care of the doll (Rothbaum & Rusk, 2011). The American children might also be angry about their inability to fix the toy, but may have felt less concerned about the authority figure's reactions to add to their anger responses. Additionally, given less emphasis on obeying authority figures in the individualistic society, American children's anger might be more outward-oriented at the fact that they were given an easily broken toy to play with.

Secondly, traditional Asian and Chinese culture does not welcome the expression of negative emotions (Markus & Kitayama, 1999). Japanese adults have been found to intentionally inhibit their negative emotions more than the Americans in social contexts (Ekman & Friesen, 2003). Moreover, research also suggests that intentional suppression of negative emotions is not only associated with decreased facial displays, but also increased cardiovascular activation. The experienced emotion did not get dampened physiologically or psychologically, despite the decrease in overt expressive responses (e.g., Roberts, Levenson, & Gross, 2008). In the current study, Chinese children may have made great effort to inhibit their negative emotion and their behavioral approach toward the forbidden toy in the resistance to temptation task, but over time, their efforts might have reached their limit. By the time they were introduced to the second toy (which could have reminded them that they couldn't play with the desirable temptation toy) and

especially when the second toy was broken, they may have become unable to inhibit their anger any more. Supporting this interpretation was the fact that Chinese children also were significantly quicker to touch the temptation object than American children, which suggests that their behavioral inhibition may have been compromised by their need to also inhibit their emotional expression. It would be useful to add physiological measures in future studies using these paradigms with young Chinese and American children to clarify the current results.

In summary, the cross-culturally different temporal patterns of children's happiness, anger, and sadness indicated that Chinese and American children differed in their emotional profiles and trajectories, even when they were facing the same social challenges. Although certain emotions (e.g., Chinese children's anger) were not observable in the context in which they were expected to occur (e.g., the resistance to temptation episode), this did not necessarily indicate the absence of such an emotion. Moreover, emotion may manifest a different temporal pattern in particular children or particular groups of children than in the sample as a whole. Similarly, when a child expressed a certain emotion in an unexpected context (e.g., Chinese children's faster anger in the introduction of the second new toy); the emotion might have been accumulated from some previous events, rather than the immediate context. Consideration of both the previous and the immediate contexts is important in interpreting the processes of emotions.

There are a few limitations of the current study that should be addressed. First, although facial, vocal, and bodily emotion cues, as well as contextual characteristics, were comprehensively considered in the coding of each emotion, the equally important physiological indices were not included, and these might have clarified findings with the overt emotional responses. Future studies should try to incorporate physiological measures, as well as self-report

of subjective feelings for older children and adults, along with the variables included in the present study, to get a more complete and accurate measure of emotion processes. Secondly, the setting was slightly different for the American and Chinese children in the current study, because the teacher rather than the mother was the familiar adult who was present during the observation on the Chinese children. Although the familiar adult – either the American mother or the Chinese teacher – was instructed to sit in the corner of the room and not engage with the children, it is hard to know whether this slight difference in the setting had any different impact on the American and Chinese children's emotional responses in these contexts. Third, discoveries from this study should be generalized to other samples with caution, considering the relatively small sample from each of the populations.

Despite these limitations, findings from the current study broadened our understanding about the general responsiveness and temporal trajectories of American and Chinese preschoolers' happiness, anger, and sadness in the two highly socialized contexts of resistance to temptation and standard violation. The adoption of multiple facial, vocal, bodily, and contextual indicators of emotions also increased the credibility in the coding of emotions. The differentiation between anger and sadness as separate negative emotions also helps reveal the different functions and processes of each emotion. The findings on the temporal trajectories of each emotion are especially informative for practitioners to gain a more process-oriented perspective toward children's emotions and identify the appropriate time point to intervene children's emotional processes.

CHAPTER 3 – STUDY 2: CULTURAL DIFFERENCES IN CONTEXT-SPECIFIC BEHAVIORAL RESPONSES

Introduction

In any emotion-eliciting situation, various behavioral responses are launched to effect regulation by emotion and/or regulation of emotion. Happiness encourages flexible exploration of the environment, but needs to be regulated once its intense exuberance distracts one from focusing on tasks or its display violates the social expectation for the context. Anger helps one focus attention and direct energy to the problem at hand, but needs to be regulated once it becomes so intense that it initiates aggressive behaviors that risk injuring oneself, others, and relationships. Sadness gives one the needed time and room to conserve energy and obtain nurturance, but needs to be regulated when one avoids and loses hope for even attainable goals which are adaptive in the context. Behavioral responses might be effective in coordinating one's cognitive, emotional, and behavioral processes to achieve certain context-specific goals, but may not be so effective in other contexts or for other goals. Thus, one should recruit different behavioral responses across different emotion eliciting situations as a function of the type and intensity of emotions, the particular goals, contextual requirements, and the available resources for regulation. Examining young children's behavioral patterns in emotion-eliciting social challenges can provide important information about how children at this age are able to effectively organize their behaviors to both cope with emotions and meet social standards.

The propensity for certain behaviors to be utilized or to be effective is likely to be influenced by one's sociocultural background. In particular, it seems logical that more individualistic cultures would promote more agentic, problem-focused responses aimed at achieving individual goals; whereas more collectivistic cultures would promote responses that

facilitate smooth, harmonious social relationships and reduce “loss of face” or social censure. Comparing the behavioral patterns of children from different cultural backgrounds can test such speculations as well as informing inferences about cultural differences in socialization. Thus, my second study is designed to compare American and Chinese preschoolers on the type, amount, and temporal characteristics of their behavioral responses in contexts with different social standard challenges.

It is important for children to develop a wide range of behavioral responses and the ability to use them flexibly according to different contextual constraints. Among young children, commonly observed behavioral responses include attention regulation and object-, social-, and self-directed ones. Some of these responses are already present during early infancy. When 5- and 10-month-old infants were exposed to anger-eliciting contexts of arm-restraint and toy removal, their attentional strategies including looking around the room, looking at the focal toy, and looking at other objects (e.g., seat, camera) (Stifter & Braungart, 1995). During toddlerhood, children’s use of spontaneous object-directed problem-solving and information seeking behaviors in fear-provoking contexts kept increasing as they got older (Parritz, 1996).

Feldman and colleagues (2011) examined 2 to 3-year-old children’s behaviors in response to toy removal, delay of gratification, and unavailability of the mother (still-face situation, in which a mother temporarily becomes unresponsive to her baby during a normal interaction) and found that use of behaviors such as toy exploration and attention regulation (distraction from the focal stimulus) was more frequent in the toy removal condition than in the still face and delay of gratification conditions (Feldman, et al., 2011). During the preschool years, children became increasingly competent at sustaining, shifting, and inhibiting their attention so that their resistance to intermittent distractions kept improving (Kannass & Colombo, 2007).

Facing a toy in a locked box, preschoolers were not only able to use attention manipulation to regulate their frustration; they also displayed object-oriented strategies, such as trying different ways to open the box, asking for instructions, and attempting to break the box (Dennis, Cole, Wiggins, Cohen, & Zalewski, 2009). Thus, children's behavioral response is context-dependent from early on and their repertoire of behaviors keeps increasing throughout early childhood and beyond.

Social-oriented behavioral responses involve the use of others to regulate one's own emotions, such as seeking proximity, physical contact, or help from caregivers. As Kopp (1989) suggested, in earliest development, caregivers provide crucial external support for infants' emotion regulation and infants learn to turn to them to help them regulate their emotions. During their first year, infants were already able to use intentional vocalizations and gestures to signal caregivers about their need for assistance (e.g., Chen, Green, & Gustafson, 2009) and referred to the others' emotional expressions to guide their own actions in ambiguous situations – a process called “social referencing” (e.g., Kim & Kwak, 2011). Facing fear-provoking stimuli, toddlers displayed social referencing, proximity seeking, whining, and demanding expressions with their mothers (Parritz, 1996). When available, social oriented behaviors are indeed effective for children's emotion regulation. Even in tasks intended to elicit toddlers' negative emotions, mothers' involvement still triggered more positive emotions than negative ones as toddlers frequently engaged and referenced their mothers (Diener & Mangelsdorf, 1999). When the mothers intentionally constrained their interactions, toddlers displayed more help-seeking behaviors and more negative than positive emotions. But looking at their mothers still decreased children's frustration despite mothers' unresponsiveness. Across toy removal, still face, and delay of gratification conditions, 2- and 3-year-olds' proximity-seeking was used most frequently

in the still face paradigm when mothers were physically available but not facially responsive as usual (Feldman et al., 2011). Thus, contexts provided different social resources for children's behavioral responses, and the effectiveness of responses varied by their match with children's primary goals.

Self-directed responses represent the overlap between the interrelated constructs of emotion regulation and self-regulation. Self-regulation refers to attempts to alter "one's mode of thinking, feeling, or behaving to reach a goal, which one would not obtain by remaining in the current mode" (McClelland, Ponitz, Messersmith, & Tominey, 2010). When the attempts were achieved through emotional processes or for the purpose of regulating emotions, they exemplify both emotion regulation and self-regulation (Barrett, 2013). Thus they are also referred to as emotion-related self-regulation (Eisenberg, Spinrad, & Eggum, 2010). Even during early infancy, children already possessed responsive and nonconscious self-soothing processes to help with their emotion regulation, such as nonnutritive sucking, rocking, or hand clasping. Soothing behaviors were suggested to redirect young children's focus onto alternative sources of stimulation, so that their existing distress about painful stimuli was dampened (Campos, 1989). In the frustrating arm-restraint and toy removal situations, self-soothing was the strategy most frequently used by infants (Stifter & Braungart, 1995). With development, although early automatic and nonconscious processes may still persist, more complex and volitional self-regulatory skills can be recruited for the purpose of emotion regulation. Self-comfort behaviors (stylized, rhythmic, or repetitive manipulation of clothing or body) became more consistent across situations at 18 months when children were facing novelty (Parritz, 1996). In addition to self-soothing, 2- and 3-year-olds also displayed self-talk to help themselves calm down. Both of these behaviors were frequently observed in the still face episode (Feldman et al., 2011), but

rarely used during the delay of gratification (Feldman et al., 2011; Grolnick, Bridges, & Connell, 1996). During the preschool years, distracting active imaginary play, dancing, or singing has been observed when children needed to delay gratification (Dennis, Cole, Wiggins, Cohen, & Zalewski, 2009). Metacognitive private speech was found to monitor, correct, and reinforce children's goal-oriented behaviors effectively (Liebermann, 2010; Montero & De Dios, 2006). Thus, more advanced self-directed processes are available for preschoolers in coping with emotions and contextualized challenges.

Much as was true for emotional responses, there may be sociocultural specificity in behavioral responses: cultural rules may specify the contexts which require regulation, expectations for appropriate types of behavioral responses, or the desirability and perceived effectiveness of a specific behavioral response. As many researchers recently proposed, focus on the agentic self versus one's relationship with others marks a key difference between individualistic and collectivist cultures in behavioral responses (Rothbaum & Rusk, 2011; Trommsdorff & Cole, 2011). Through development and socialization, children in all cultures need to achieve a good balance between individual desires and sociocultural expectations, but the point of balance varies across cultures.

According to the thorough review by Rothbaum and Rusk (2011), the goodness-of-fit between behavioral responses and specific sociocultural contexts is the common pathway for children to internalize both the behavioral response and the sociocultural standards. In individualistic cultures, which emphasize personal independence, the culture-specific goal is to achieve autonomy, self-agency, personal happiness and confidence. The corresponding behavioral responses involve protecting one's internal attributes, changing the environment to fit oneself, enjoying and persisting with self-selected goals, expressing authentic emotions, and

redirecting from negative to positive emotions. By contrast, in collectivist cultures, which emphasize interpersonal relationships, the culture-specific goal is to achieve social harmony, group-agency, and personal improvement. The corresponding behavioral responses involve being sensitive to others' expectations, desires, and needs; changing oneself to accommodate the others and the larger context; enjoying and persisting with goals selected by trusted others; being calm emotionally; and redirecting attention from one's own emotions to others' emotions.

The self-regulatory behavioral responses of Chinese and Americans (or persons from other individualistic countries) and their correlates have been compared by researchers. For example, emotion suppression was associated with poor psychological functioning among American college students, but not among Chinese college students (Soto, Perez, Kim, Lee, & Minnick, 2011). Among young children going through the process of internalizing sociocultural standards from their socialization agents, cross-cultural studies consistently have found Chinese preschoolers to be superior in their executive function skills (e.g., response inhibition, cognitive conflict resolution, working memory) when they are instructed to engage in cognitive regulation (e.g., say "day" when you see a moon but say "night" when you see a sun) and behavior regulation tasks (e.g., touch your head when you hear "touch your toe" but touch your toe when you hear "touch your head") (Lan, Legare, Ponitz, Li, & Morrison, 2011; Sabbagh, Xu, Carlson, Moses, & Lee, 2006). Such findings suggest that Chinese children show higher levels of self-regulation than American children.

However, one study specifically compared Australian and Chinese 3 to 5 year olds' behavioral responses in delay of gratification tasks, and their findings suggested, in contrast, that Australian children engaged in more effective self-regulation than Chinese children in this particular context (Yang, Wang, Liu, Cuskelly, & Zhang, 2005). The Australian preschoolers

displayed more self-initiated distractive behaviors than the Chinese preschoolers, including singing, walking around the room, or playing with their hands or clothes, and, perhaps as a result, the Australian children were able to wait longer than the Chinese children. The researchers proposed that the individualistic orientation of the Australian culture influenced the socialization of children by cultivating children's autonomy, personal responsibility, and self-help skills throughout daily life practices in both the home and school settings. Thus, Australian children developed a wider range of self-initiated behaviors to help them cope with challenges independently when the adults were unavailable to help. In contrast, Chinese culture emphasizes external regulation from authority figures, which may have inhibited children's outward-directed coping strategies when authority figures tell them to wait. Instead, they might be more prone to quietly change themselves (their emotion) or to avoid interacting with the forbidden treat, without disturbing others or pursuing other activities.

Based on the aforementioned review on cultural differences in self-regulation, one might expect children from China and other collectivist cultures to have the behavioral tendency to change their own emotions and to follow the authority-imposed rule, rather than engaging in instrumental behaviors when faced with emotionally challenging events; whereas children from North America, Australia, and other individualistic cultures might have the behavioral tendency to initiate changes in the external context. Specifically, children from collectivist cultures might be prone to engage in emotion-focused regulation, such as avoidance and self-soothing behaviors, which help children leave discomfort behind and restore comfort in themselves but do not involve instrumental acts toward social and nonsocial objects in their environment. However, children from individualistic cultures may tend to actively distract themselves by interacting with objects and people in the environment or engaging in self activities – such as singing and

dancing – all of which change the context from being stressful to entertaining without making effortful internal adjustment. Additionally, children from collectivist cultures might be better at inhibitory self-regulation (e.g., response inhibition), especially when the rule is explicit and enforced with the presence of an authority figure. By contrast, children from individualistic cultures might be more agentic in coming up with self-distractive strategies without guidance or permission from the adults. However, to my knowledge, no studies to date have compared the behavioral responses Chinese and American preschoolers spontaneously adopt in multiple emotion-eliciting contexts.

The current study aimed to test these assumptions among the American and Chinese young children by exposing children to the same challenging tasks introduced in Study 1: resistance to temptation and standard violation (mishap). The following research questions were explored: (1) Do American children display more context-focused behavioral responses including instrumental object-directed, social-directed, and self-distractive behaviors to agentially overcome contextual challenges to their own well-being and/or realization of personal goals? (2) Do Chinese children use more emotion-focused responses including avoidance and soothing behaviors to adapt themselves to the context? (3) When contextual demands change over time, do children's behavioral patterns change as well in both cultures?

Children's potential behavioral responses in both tasks have been identified in some extant studies with American toddlers and preschoolers. When children had to wait for a desired gift, they displayed focal attention on the gift, attention distraction, behavioral distraction, talk to the present adult about the waiting or other irrelevant topics, comfort-seeking, self-soothing, and defiant or aggressive talk and behavior (Cole et al., 2011; Dennis, Cole, Wiggins, Cohen, & Zalewski, 2009). When children were playing with a doll and the doll's arm/leg fell off, their

behavioral responses included focal attention at the doll, attention distraction, repairing the doll, confession to the present adult about the mishap, gaze or body aversion from the adult, and self-soothing (Barrett, 2005; Barrett, Zahn-Waxler, & Cole, 1993; Cole, Barrett, & Zahn-Waxler, 1992). The current study will build on these findings and identify behavioral responses from both an American and a Chinese sample across the two tasks. I will also track children's use of behavioral responses in real time to explore the patterns in children's strategy use.

Method

Participants

Same as Study 1.

Procedure

Same as Study 1.

Coding of Behaviors

Children's behavioral responses were coded in real time among three primary groups: object-directed, social-directed, and self-directed behaviors. Within each group, different attentional, vocal, and physical responses will also be coded. An "other" code was included within each group and used when the child's behavior cannot be categorized into any of the other behaviors defined in that group. The resistance to temptation and standard violation (mishap) tasks share the same three primary groups of behaviors. However, the first task explicitly prohibits children from interacting with the focal toy, whereas the latter task encourages children to interact with the focal toy. Thus, a greater number of specific, object focused behavioral responses were coded for the standard violation task than the resistance to temptation task. The codes were defined based on extant studies (Barrett, 2005; Dennis, Cole, Wiggins, Cohen, & Zalewski, 2009) and further adapted to accommodate continuous real time coding and task-

specific behaviors. Table 4 and Table 5 summarize the codes for the two tasks respectively. The task episodes were coded simultaneously to mark the changes among episodes of introduction of the toy robot, resistance to temptation, introduction of the clown rag doll, free play with the doll, and the mishap period after the doll's arm/leg falls off until E debriefs the child.

Table 4
Behavioral responses in the Resistance to Temptation Task

Behavioral responses	Definitions
Object Directed	
Focal touch	Touch, move, or play with the robot. Eye contact with the robot can occur at the same time
Focal-attention	Look at, point at, or directly talk about the robot, but without any physical contact.
Avoid focal	The child was originally touching or paying attention to the robot. Then the child withdraws attention from the robot, but does not direct the attention to anything else meaningful.
Other-aggressive	Attention is not directed to the robot at all. Interaction with the nonfocal object(s) (such as furniture, other toys, etc.) violates social rules explicitly.
Other-attention	Interact with or being attentive to the other objects, the other people, the self, etc. just not paying attention to the robot
Social Directed	
Help/comfort seeking	Actively engage in social contact (verbal or physical) for the purpose of comfort or help seeking.
Social-attention	Actively interact with or look at the other person, but not for comfort/help seeking purpose.
Self-Directed	
Self-attention	Gross motor behaviors, instrumental behaviors toward the self, verbally talk about the self, or just look at the self.
Hide-self	Explicitly hide oneself from the outside world (trying hard not to be visible) by crawling under furniture, covering the face with hands or objects, duck behind mother, or head down, etc.
Self-soothing	Noninstrumental, repetitive behaviors directed toward the self, without evident attention to such behaviors.

Table 5

Behavioral responses in the Standard Violation (Mishap) Task

Behavioral responses	Definitions
Object Oriented	
Focal repair/ problem-solving	Direct physical contact with the doll for the purpose of figuring out the problem or solution, including making attempts to put the broken arm/leg back into the doll's body, talking about solutions to get the doll fixed, or verbally asking others to fix the doll.
Focal acknowledge mishap	Physically show or verbally acknowledge that the mishap has occurred.
Focal nonmishap activity	Direct physical contact with the doll in an exploratory or playful way, but not doing anything about the mishap.
Focal aggressive	Direct physical contact with the doll which violates social rules explicitly, such as banging the doll violently, or throwing the doll on the floor, etc.
Focal touch	Stare at and touch the doll at the same time, but not manipulating the doll in any active way.
Focal-attention	Look at, point at, or directly talk about the doll, but without any physical contact.
Avoid focal	Same definition as in the resistance to temptation task.
Other-aggressive	Same definition as in the resistance to temptation task.
Other-attention	Same definition as in the resistance to temptation task.
Social Oriented	
Help seeking	Verbal or physical interaction with the present adult with the purpose of help seeking, such as talking to the mother/teacher about the focal task (mishap, broken doll) in an instrumental way,
comfort seeking	Proximity seeking as indicated by the child's position being closer to the mother/teacher than to the table (where C is supposed to be). Speech to the present adult with content relevant to emotion or emotion regulation or seeking comfort.
Social-attention	Same definition as in the resistance to temptation task.
Self-Oriented	
Self-attention	Same definition as in the resistance to temptation task.
Hide-self	Same definition as in the resistance to temptation task.
Self-soothing	Same definition as in the resistance to temptation task.

The Noldus Observer XT 10.0 software package (Noldus Information Technology, 2010) was used for coding. The behavioral responses and task episodes have been given short, concise titles to assist the coding process in the Noldus system. To facilitate continuous coding and later sequential analysis on durations of behavioral responses, behavioral responses inside each group were coded as mutually exclusive state events. For example, among object-oriented behaviors,

the child cannot be coded as attending to and avoiding the focal toy at the same time. But behaviors from different groups can occur at the same time. For example, a child is using object, social, and self-directed behaviors at the same time when he/she is rocking on the chair and talking to the adult about the focal toy. The change or end of each event (e.g., attention to the focal toy or avoidance of the focal toy) is marked by the entry of a new code in the same category.

A pilot study was first conducted with a subset of the videos (5 for Chinese children and 5 for American children) to test the feasibility of using the initial coding scheme in Noldus. The primary researcher and a trained research assistant, both of whom are fluent in both English and Chinese, independently coded each video. After coding each video, the two coders discussed their disagreements and remaining questions together with a child behavioral coding research expert. The coding scheme was further refined with added details, clarifications, decision rules, and examples to best capture the full range of behavioral responses and individual variations.

The Chinese and American samples were independently coded by two trained coders whose native language is Chinese or English, respectively. The primary researcher coded 25% of randomly selected videos to calculate interrater reliability with each pair and continued to code at random to calculate drift reliability. As in the pilot study, disagreements or uncertainties between coders were resolved through consensus between the coders, the primary investigator, and the child research expert to create the final version of the coding for each video. Reliability between the two main coders for each sample was calculated using Cohen's kappa, based on agreement throughout the observations (see Table 6).

Table 6
Interrater Reliabilities of Behavioral Responses

	Resistance to Temptation	Standard Violation
CN- <i>kappa</i>	.74	.76
US- <i>kappa</i>	.71	.72

Results

Task Conditions

Children's behavioral responses were observed in three task conditions: (1) resistance to temptation, (2) play period with the clown rag doll before the doll was broken (pre-mishap play), and (3) the mishap period after the doll's arm/leg falls off. These three episodes were chosen because children's behaviors during these periods were more comparable when they were facing the focal toy alone, without the experimenter's presence.

Variable Derivation and Calculations

Frequency analyses were conducted among all coded behavioral responses to provide a basis for variable elimination and aggregation. Table 7 provides the frequencies of each coded behavior in each of the selected task conditions. Only one focal oriented behavioral category (focal attention) was available in the resistance to temptation episode because as soon as a child touched the focal (temptation) toy, the episode was terminated. On the contrary, multiple focal oriented behaviors were available in the pre-mishap play and standard violation episodes (see Table 5). Based on functional similarity, all focal oriented behaviors toward the clown doll in the pre-mishap play and standard violation episodes were aggregated into one focal attention category to enable comparison with the focal attention category in resistance to temptation episode. All focal oriented behaviors in the pre-mishap play and standard violation episodes were mutually exclusive categories, such that the different types of focal responses could not occur concurrently. Therefore, the percentage of total time measures should be comparable across the resistance to

temptation, premishap play, and standard violation episodes, even though the last two contexts had multiple categories that were aggregated. Based on functional similarity and the low frequencies of help seeking and comfort seeking behaviors among Chinese preschoolers, an aggregated social attention category was created in each task condition to include the original social attention, help seeking, and comfort seeking behaviors. Similarly, the infrequent “hide self” behaviors were merged into the self-attention category in each episode. Next, the percentage of time children displayed each of the final categories (time that category was displayed divided by total duration of episode) was derived for each task condition.

Table 7
Frequencies of Behavioral Responses in Resistance to Temptation, Premishap Play, and Standard Violation/Mishap Episodes

Behavioral Responses	Resistance to Temptation		Premishap Play		Standard Violation	
	CN	US	CN	US	CN	US
Object Oriented						
Focal repair/ problem-solving	NA	NA	NA	NA	32	33
Focal acknowledge mishap	NA	NA	NA	NA	31	37
Focal nonmishap activity	NA	NA	34	35	24	37
Focal aggressive	NA	NA	0	0	4	4
Focal touch	NA	NA	8	13	3	2
Focal-attention	34	39	11	6	19	17
Avoid focal	20	20	9	5	22	5
Other-aggressive	0	1	0	0	0	0
Other-attention	34	39	12	5	26	23
Social Oriented						
Help seeking	0	24	0	2	7	30
comfort seeking			0	2	3	16
Social-attention	24	37	32	23	30	34
Self-Oriented						
Self-attention	17	34	9	13	15	29
Hide-self	0	7	0	0	0	1
Self-soothing	32	37	26	22	30	33

Cultural Differences in Children's Overall Measures of Behaviors

To examine whether American children generally display more outward oriented behaviors than Chinese children and whether Chinese children generally display more inward oriented behaviors than American children, composite percentage scores of each behavioral response were created by averaging the percentage of time they displayed each behavioral response across the three task conditions. Table 8 presents the descriptive data of the composite percentage scores for each behavioral response.

Table 8
Means and Standard Deviations for Overall Percentages of Behavioral Responses

		Focal Attention <i>M</i> (<i>SD</i>)	Focal Avoidance <i>M</i> (<i>SD</i>)	Object Attention <i>M</i> (<i>SD</i>)	Social Attention <i>M</i> (<i>SD</i>)	Self Attention <i>M</i> (<i>SD</i>)	Self Soothing <i>M</i> (<i>SD</i>)
	<i>N</i>						
American							
Female	19	61.11 (14.43)	2.04 (3.62)	28.86 (8.43)	38.16 (24.16)	11.69 (13.74)	27.29 (22.82)
Male	20	62.36 (12.49)	0.93 (1.72)	33.58 (9.73)	54.43 (23.56)	7.79 (7.71)	16.42 (12.23)
Total	39	61.75 (13.31)	1.47 (2.83)	31.28 (9.31)	46.50 (24.94)	9.69 (11.10)	21.72 (18.75)
Chinese							
Female	17	57.42 (18.71)	2.70 (2.97)	36.29 (17.40)	19.34 (20.38)	3.04 (5.78)	25.97 (14.35)
Male	18	62.57 (10.29)	7.01 (6.98)	28.94 (11.83)	15.99 (10.02)	4.69 (4.81)	29.99 (21.91)
Total	35	60.07 (14.98)	4.92 (5.77)	32.51 (15.04)	17.62 (15.77)	3.89 (5.29)	28.04 (18.47)

Note: The overall percentage of each behavior was calculated by averaging the percentage of time children's displayed the behavior in each of the three task conditions (resistance to temptation, premishap play, and standard violation).

Then a 2 (Nationality) \times 2 (Gender) multivariate analysis of covariance (MANCOVA) was conducted, with age as a covariate, to examine whether children from the two samples differ in the percentage of time they displayed focal attention, focal avoidance, object attention, social attention, self-attention, and self-soothing behaviors. A significant main effect was obtained for

Culture, $F(6, 64) = 3.92, p = .002, \text{partial } \eta^2 = .27$; but this was qualified by a significant Culture \times Gender interaction, $F(6, 64) = 2.28, p = .046, \text{partial } \eta^2 = .18$. Follow-up univariate analyses of covariance (ANCOVAs) for the main effect of Culture indicated that children from the two samples differed significantly in their overall percentage of focal avoidance, $F(1, 69) = 4.24, p = .04, \text{partial } \eta^2 = .06$; social attention, $F(1, 69) = 16.94, p < .001, \text{partial } \eta^2 = .20$; self-attention, $F(1, 69) = 4.30, p = .04, \text{partial } \eta^2 = .06$; and self-soothing, $F(1, 69) = 5.65, p = .02, \text{partial } \eta^2 = .08$. Referring to the results in Table 8, Chinese children showed significantly more focal avoidance and self-soothing behaviors than American children; whereas American children showed significantly more social attention and self-attention than Chinese children.

However, univariate follow-ups of the Culture \times Gender interaction indicated significant interactions with Gender for two of these variables: focal avoidance, $F(1, 69) = 7.46, p = .008, \text{partial } \eta^2 = .10$, and social attention, $F(1, 69) = 4.20, p = .04, \text{partial } \eta^2 = .06$. More specifically, although Chinese children generally displayed more focal avoidance, Chinese males displayed avoidance more than Chinese females; whereas American females displayed avoidance more than American males. Similarly, Chinese females also displayed more social attention than Chinese males, but American males displayed more social attention than American females. Univariate interactions of Culture with Gender were not significant for self-attention or self-soothing. However, the interaction was significant for object attention, $F(1, 69) = 4.59, p = .04, \text{partial } \eta^2 = .06$, with Chinese females displaying more object attention than Chinese males; whereas, American males displayed more object attention than American females (see Table 8).

In summary, cultural differences in children's behavioral responses in the selected task conditions were more complex than originally hypothesized. American children's greater context-focused response was supported by their greater social attention and self-attention, which

redirected children's attention from the stressful focal toy to other purposeful social interactions or self-activities. Further, Chinese children did display greater focal avoidance and self-soothing behaviors, which was consistent with their hypothesized greater emotion-focused response. The Culture \times Gender interaction in children's focal avoidance, object attention, and social attention indicated different directions of gender difference in the two samples.

Cultural Differences in Changes of Children's Context-specific Behaviors

To examine how children's behavioral responses change over the three different task conditions (resistance to temptation, premishap play with the clown rag doll, and the mishap period after the doll's arm/leg falls off) and whether American and Chinese children differ in their patterns of change, a within-subject MANCOVA was conducted. In order to maintain an adequate subject-to-variable ratio in more complex analyses, the behavioral categories were further aggregated based on their correlations and functional similarity. As indicated earlier, social attention, (nonfocal) object attention, and self-attention all function to distract one from the challenging object in the two challenging situations, so it seemed reasonable, conceptually, to aggregate these three variables. However, first correlations were conducted to ensure that these variables were at least somewhat related to one another, supporting the inference that they measured similar constructs. Correlations were not expected to be high, given that different children might choose different forms of distraction; however, these variables were expected to be at least correlated at a small to moderate level. Table 9 shows the correlations among these behaviors in each task condition. Object attention and social attention were positively correlated in the resistance to temptation condition ($r = .28, p < .05$). Social attention and self-attention were positively correlated in the standard violation condition ($r = .29, p < .05$). These results provided some support for the functional similarity among object attention, social attention, and

self-attention. Therefore, object attention, social attention, and self-attention were aggregated into a distraction category in each task condition to capture any purposeful nonfocal attention of the children.

Table 9

Correlations among the Behavioral Responses in Three Task Conditions (Resistance to Temptation, Premishap Play, and Standard Violation) by Percentage of Duration

		1	2	3	4	5	6
Resistance to temptation	1 Focal Attention	—					
	2 Avoid Focal	.01	—				
	3 Object Attention	-.86**	-.43**	—			
	4 Social Attention	-.13	-.40**	.28*	—		
	5 Self-Attention	-.20	.06	.10	.16	—	
	6 Self-Soothing	.08	.37**	-.23*	-.30**	-.12	—
Premishap play	1 Focal Attention	—					
	2 Avoid Focal	-.36**	—				
	3 Object Attention	-.57**	.54**	—			
	4 Social Attention	.07	-.10	.04	—		
	5 Self-Attention	-.08	.20	.20	.22	—	
	6 Self-Soothing	-.05	.14	-.15	-.03	.20	—
Standard Violation	1 Focal Attention	—					
	2 Avoid Focal	-.33**	—				
	3 Object Attention	-.77**	.06	—			
	4 Social Attention	.04	-.30*	.01	—		
	5 Self-Attention	-.02	-.09	-.01	.29*	—	
	6 Self-Soothing	-.11	.03	.10	-.16	-.05	—

** $p < 0.01$ level.

* $p < 0.05$ level.

Based on this aggregation, the within-subject MANCOVA was conducted on children's focal attention, focal avoidance, distraction, and self-soothing, with Culture and Gender as the between-subject factors, the task condition as the within-subject factor, and age as a continuous covariate. The percentage of time scores for each behavior in each task condition were the variables measured repeatedly. Gender did not show any significant effects or interactions, and thus was removed from the final analyses. Differences between the American and Chinese children were evidenced by a significant main effect of culture, $F(4, 65) = 3.71, p = .009$, *partial*

$\eta^2 = .19$), that was qualified by a significant Episode \times Culture interaction, $F(8, 61) = 3.12, p = .005, \text{partial } \eta^2 = .29$. Follow-up ANCOVAs for the main effect reiterated earlier findings, indicating that Chinese children showed significantly more focal avoidance, $F(1, 68) = 6.52, p = .013, \text{partial } \eta^2 = .09$; marginally more self-soothing, $F(1, 68) = 4.00, p = .05, \text{partial } \eta^2 = .06$; but less distraction, $F(1, 68) = 11.41, p = .001, \text{partial } \eta^2 = .14$, than the American children when differences the four task conditions were not considered.

Importantly, though, follow-up repeated measures ANCOVAs, with polynomial trend analyses for Episode, revealed that the American and Chinese children's distraction differed significantly in their linear trends, $F(1, 68) = 7.00, p = .01, \text{partial } \eta^2 = .09$, and quadratic trends, $F(1, 68) = 12.40, p = .001, \text{partial } \eta^2 = .15$, across the task conditions. As Figure 3 illustrates, both American and Chinese children showed greatest use of distraction in the resistance to temptation episode and the least amount of distraction in the premishap play episode. Their distraction increased to some extent in the standard violation/mishap episode, but was still much less than in the resistance to temptation episode. Although the two samples showed similar amounts of distraction in the premishap play, the American children showed much more distraction than the Chinese children in both the resistance to temptation and standard violation episodes, resulting in greater changes across the task conditions. The ANCOVAs for all other variables were nonsignificant (all ps greater than .05).

To further clarify children's use of distraction across conditions in each culture, repeated measures ANOVAs, with planned comparisons, were conducted separately on the American and Chinese children's distraction percentage of time scores. A significant main effect of Episode was obtained for both the American, $F(2, 36) = 122.96, p < .001, \text{partial } \eta^2 = .87$, and Chinese children, $F(2, 31) = 37.67, p < .001, \text{partial } \eta^2 = .71$. Follow-up within-subject contrasts

indicated that for both the American and Chinese samples, the use of distraction decreased significantly from the resistance to temptation episode to premishap play episode: $F(1, 37) = 251.11, p < .001, \text{partial } \eta^2 = .87$ for the American sample; $F(1, 32) = 73.18, p < .001, \text{partial } \eta^2 = .70$ for the Chinese sample. Then, children's use of distraction increased significantly from the premishap play episode to the standard violation episode: $F(1, 37) = 27.14, p < .001, \text{partial } \eta^2 = .42$ for the American sample; $F(1, 32) = 8.11, p = .008, \text{partial } \eta^2 = .20$ for the Chinese sample. Thus, although American children used distraction more than Chinese children; for both groups, distraction was used more in the challenging contexts than in the less stressful premishap episode.

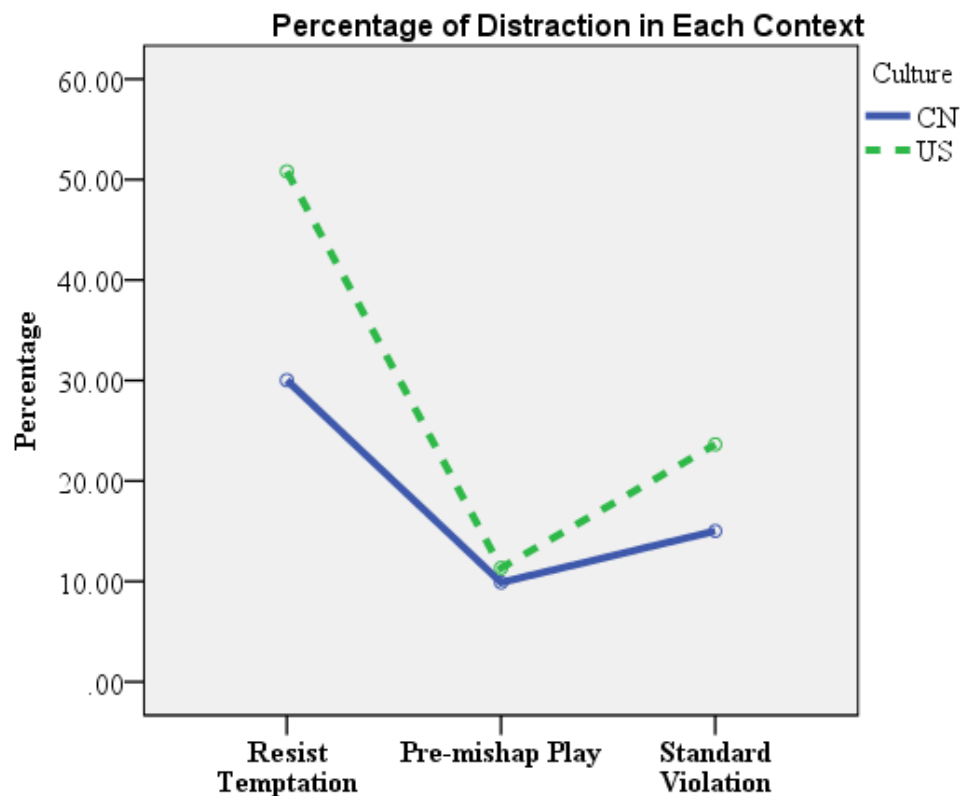


Figure 3. Changes in percentage of American and Chinese preschoolers' distraction across the three task conditions (resistance to temptation, premishap play with the clown rag doll, and the mishap period after the doll's arm/leg falls off). Percentage = (Duration of Distraction)/(Duration of each task condition); CN = Chinese preschoolers; US = American preschoolers.

Discussion

The first goal of the study was to examine whether American preschoolers adopt more context-focused behaviors to change the context to fit oneself, whereas Chinese preschoolers adopt more emotion-focused behavioral responses to adapt oneself to the context. The findings on children's overall responses across three contexts (resistance to temptation, premishap play, and standard violation/mishap) were largely consistent with the hypotheses, and provided more comprehensive details about children's behavioral responses in these contexts. Children from both samples showed equivalent overall levels of focal attention and object attention, indicating their comparable object-orientation (toward focal or nonfocal object) in these contexts. American children's greater propensity for context-focused behaviors was supported by their greater social attention and self-distractive behaviors (e.g., gross motor activities); whereas Chinese children's greater propensity for emotion-focused behaviors was supported by their greater self-soothing and focal avoidance behaviors.

These findings resonated with the theoretical proposal that facing person-context conflict, people in individualistic cultures tend to change the context, so as to protect and pursue self-selected goals (Rothbaum & Rusk, 2011). By contrast, people from collectivist cultures tend to adjust themselves, so as to protect social harmony and improve their fitness with the larger context. The findings also replicated the results from an earlier cross-cultural study on Australian and Chinese preschoolers that indicated that 3- to 5-year-old Australian children used more distractive behaviors than similarly aged Chinese children when they needed to delay gratification (Yang, Wang, Liu, Cuskelly, & Zhang, 2005). It was inferred from these findings that children from individualistic cultures were encouraged to develop agency and self-initiated

regulation earlier than children from collectivistic cultures, which emphasize external regulation from the others more than internal regulation initiated by oneself.

When emotion-focused behaviors were considered in past research, Chinese toddlers were more inhibited in novel and challenging contexts in comparison to Canadian toddlers (Chen, et al., 1998). Additionally, Canadian children's inhibition was positively associated with their mothers' rejection and punishment but negatively associated with mothers' warmth and acceptance; however, Chinese children's inhibition was positively associated with their mothers' warmth and acceptance. From toddlerhood to school age, Chinese children's early inhibition was found to predict better school competence and social relationship in middle childhood (Chen, Chen, Li, & Wang, 2009). By contrast, American children's early inhibition was maladaptive longitudinally for their social functioning, especially for children who had an attention bias to threat (Pérez-Edgar, et al., 2011). Thus, the Chinese sociocultural context seems to be quite different from the Canadian or American society, in that it accepts and even encourages young children's inhibition. In the current study, Chinese children generally displayed greater focal avoidance and self-soothing than American children. Chinese children's primary behavioral responses in novel and challenging contexts were characterized by such an emotion-focused, self-changing style that involved avoiding emotionally challenging stimuli and using noninstrumental soothing behaviors to cope with internal discomfort.

The findings were also consistent with the traditional Chinese socialization expectations of children's "age of innocence" (Ho, 1986, 1989) in which children were not expected to understand and conform to many sociocultural norms until school-age. Thus, Chinese children's autonomy and skills in independent coping with challenges might not be cultivated as much as children in individualistic cultures. Additionally, significant progress in Chinese children's delay

of gratification and use of effective self-distractive behaviors were observed among 4 and 5-year-old groups, in comparison to the 3-year-old group (Yang, et al., 2005). The 3-year-old groups in the current study may have intensified the difference between American and Chinese preschoolers due to both sociocultural background and developmental stage.

However, beyond the general group equivalence in object attention and the group difference in focal avoidance and social attention, gender differences in overall behavior across contexts showed different patterns in the American and Chinese samples. Chinese males displayed avoidance more than Chinese females; whereas American females displayed avoidance more than American males. In a longitudinal study on normal American toddlers' internalizing trajectories (Carter, et al., 2010), female toddlers were found to have significantly higher initial level and flatter declines than male toddlers in their overall internalizing tendencies. It is possible that although females are generally more inhibited by challenging contexts than males – as observed in the American sample – the Chinese culture's particular preference for young children's inhibitory tendencies led parents and teachers to impose greater socialization pressure on Chinese males, who were not as inhibited as females by nature. Therefore, Chinese male children displayed even more avoidance than Chinese female children because of the heightened socialization pressure. However, further studies on this topic are needed to clarify the phenomenon.

When object and social attention were considered, Chinese females displayed more than Chinese males; whereas American males displayed more of such attention than American females. Such observation might be the complementary side of the observation on children's focal avoidance. Because Chinese males and American females engaged in more focal avoidance during the observations, their use of object and social attention became comparatively less. The

situation was the opposite for Chinese females and American males who did not display as much focal avoidance as their opposite-sex counterparts from the same cultural background. Therefore, object and social attention were used to a greater extent for Chinese female and American male preschoolers.

The second research question centered on children's context-specific behavioral responses in the resistance to temptation, premishap play, and standard violation/mishap episodes. Besides replicating the findings on children's general responses that American children displayed more distractive behaviors and Chinese children displayed more avoidance behaviors across contexts, children's use of distractive behaviors were also found to vary across contexts for both samples. Neither the American nor Chinese children displayed much distraction when they were allowed to play with the intact clown doll during the premishap episode. But they displayed more distraction when they had to cope with challenges involved in the resistance to temptation and standard violation contexts; especially in the resistance to temptation episode when they were prevented from touching the toy..

In the current study, the use of distraction in the resistance to temptation task was mainly desirable, as it helped children redirect their attention from the focal toy that should not be touched. However, in the standard violation task, distraction was not as desirable because the toy was broken and children were expected to engage in problem-solving and repairing behaviors to instrumentally cope with the mishap. Consistent with such contextual characteristics, both American and Chinese children did show more distraction in the resistance to temptation episode than in the standard violation episode. Based on examination of differences in children's behaviors across contexts, children's use of distraction varied as a function of how much each context was likely to elicit negative emotion, what resources were available in the context, and

the task requirements of the context. These findings are similar to previous findings that when mothers' involvement was available, children displayed more social referencing and positive emotions, compared to the context when mothers' involvement was not available (Diener & Mangelsdorf, 1999).

There are a few limitations of the current study that should be addressed. First, although various object-, social-, and self-directed behaviors were coded in each context, many of them were aggregated in the analyses to create comparable behaviors across episodes and maintain adequate subject-to-variable ratio. Focal look, play, and problem-solving behaviors with the target toy, as well as social look, help-seek, and comfort-seek with the familiar adult, may all serve unique functions if analyzed separately. However, using a few short tasks with a relatively small sample limited our ability to clarify the function of each of these behaviors further. Future studies can extend the duration of observation and the possibility of different behaviors to get a better understanding about the unique profiles and patterns of different behaviors.

Secondly, the setting was slightly different for the American and Chinese children in the current study, because the teacher rather than the mother was the familiar adult who was present during the observation on the Chinese children. Although the familiar adults – either the American mothers or the Chinese teachers – were instructed to sit in the corner of the room and not engage with the children, it is hard to know whether this difference in the setting had any different impact on the American and Chinese children's behavioral responses in these contexts, especially on children's social oriented behaviors. Thirdly, discoveries from this study should be generalized to other samples with caution, considering the relatively small sample from each of the populations.

Despite these limitations, findings from the current study broadened our understanding about the general propensity for American and Chinese preschoolers to display distractive, avoidance, and soothing behaviors in the two highly socialized contexts of resistance to temptation and standard violation. It not only replicated previous theoretical and empirical evidence about American children's tendency to adopt context-focused behaviors and Chinese children's tendency to adopt self-modifying, emotion-focused behaviors, but also revealed the context-specific patterns of children's use of distraction. It is informative for parents and teachers to understand individual and cultural differences in children's primary behavioral responses toward challenge, and to help children develop alternative responses which might be more adaptive than their primary responses in particular contexts.

In the diverse American society, although individualism is the dominant cultural orientation, children are still coming from families with different levels of collectivist orientation and may have developed different behavioral tendencies when facing the same event. The effectiveness of children's behavioral responses may vary greatly across different sociocultural contexts, including transitions from home to school, or interactions with parents, teachers, siblings, and peers. It would be unfair to judge a child's behavioral adaptiveness without considering its fit across different contexts and with both the immediate environment and the broader sociocultural background. Similarly, contemporary China is going through tremendous socioeconomic and cultural changes, such that families, schools, parents, and teachers differ greatly in their adherence to traditional collectivism and western individualism. To increase contemporary Chinese children's behavioral adaptiveness across contexts, it is beneficial to arm children with a wide range of behavioral responses and encourage children's autonomy to initiate different behavioral responses even without the explicit guidance from adults.

CHAPTER 4 – STUDY 3: CULTURAL DIFFERENCES IN RECIPROCAL TIME RELATIONSHIPS BETWEEN EMOTIONAL AND BEHAVIORAL RESPONSES

Introduction

As reviewed earlier, regulation by and of emotions are interdigitating processes that almost always occur and influence each other concurrently and/or contiguously during emotion processes. It is empirically challenging but practically useful to separate the two processes, so that we can understand how each process operates and how one can better utilize emotions to motivate and organize goal-directed behaviors, while adjusting emotions if their intensities, durations, or misfit with the contexts cause difficulties. To cope with the empirical challenge, contemporary emotion researchers have offered some convergent methodological suggestions, including giving clear conceptual and operational definitions for emotions and emotion regulation, observing multiple indicators for both emotional and behavioral responses across different contexts, investigating changes over time in emotion and behavioral responses in relation to each other, and considering relations to the context when interpreting the functions of both processes (Barrett, 2013; Cole, Martin, & Dennis, 2004; Lewis & Stieben, 2004).

This study adopts these empirical guidelines to examine Chinese and American preschoolers' emotion regulation processes in both the resistance to temptation and the standard violation (mishap) tasks. My operational definition of regulation by emotion is the propensities of children's object, social, and self-directed behaviors immediately following emotional responses of happiness, sadness, or anger. My operational definition of the regulation of emotion is the propensities of children's emotional responses that are related systematically to children's prior object, social, and self-directed behaviors. Emotional responses will include facial, vocal, and bodily indicators; and regulatory behaviors will include attentional, verbal/vocal, and gross

motor behaviors. The resistance to temptation and standard violation (mishap) tasks both impose socially challenging demands on children, but with slightly different emphases – inhibit a desired behavior versus regulate responses to having engaged in a negatively sanctioned behavior. There are many instances of both putative regulatory behaviors and emotional responses, embedded in the two contexts, allowing for several possible methodological approaches to studying temporal relations among emotional and regulatory behaviors.

For decades, researchers have created different procedures to analyze the relations between emotional and behavioral responses. These efforts have not only enriched our understanding of the underlying mechanisms, but also highlighted the need for more investigations on this topic with greater detail and precision. In one study, toddlers were observed in both a maternal separation (with or without the presence of an experimenter) and a delay of gratification task (with the mother being responsive or unresponsive) (Grolnick, Bridges, & Connell, 1996). Correlations between children's emotional and behavioral responses were examined in each task. In all but the delay task with an unresponsive parent, children's distress was negatively associated with their engagement with nonfocal objects but positively associated with their focus on the forbidden object (temptation toy or parent from whom they were separated). In the delay task with an unresponsive parent, children's distress was positively associated with their self-soothing behaviors. Although such correlational analysis has implied the potential relationship between emotional responses and regulatory behaviors based on their frequencies, it cannot reveal the actual temporal relationships between the processes.

Some other studies have tried to examine temporal patterns directly, using contingency analyses. For example, Stifter and Braungart (1995) examined how different behavioral responses were utilized when 5- and 10-month-old infants' level of negative response was

increasing, decreasing, or stable every 20 s during anger-eliciting tasks. They found avoidance, communicative vocalizations, and gestures more frequent but attention to nonfocal objects less enduring when infants' negativity was increasing rather than decreasing or stable.

Two other studies examined how fear and anger responses changed after children displayed a particular behavioral response (Buss & Goldsmith, 1998; Diener & Mangelsdorf, 1999). One study was done with 6-, 12-, and 18-month-old infants with emotions and behavioral responses scored within 5-s or 10-s epochs (Buss & Goldsmith, 1998). When fear was elicited by fearful novel toys, avoidance was found to have a reducing effect, whereas other behavioral responses (e.g., approach the focal toy, distraction, and looks to the mother) were found to have a maintaining effect (fear neither increased nor decreased) on fear expression in the following epoch. When anger was elicited by blocking a desired toy with a barrier or restraining the infants' arm movement, behavioral responses which maintained fear were all found to be followed by decreased anger, highlighting the importance of considering context and specific negative emotion in making predictions about efficacy of various emotion regulatory responses.

The other study was with 18- and 24-month-old toddlers with emotions and behavioral responses scored within 15-s epochs (Diener & Mangelsdorf, 1999). Fear was elicited by novel toys and anger was elicited by taking a desirable toy out of the child's reach and the delay of gratification task. Fussing to the mothers was found to minimize children's negative responses in all episodes. Avoidance was found to minimize fear but not anger; whereas tension release (high-intensity motor behavior such as waving arms or stomping feet) was found to minimize anger but not fear. Using similar methods, the organizing function of emotions on behavioral responses has been identified when preschoolers' actions were analyzed within 10 s after their display of happiness, sadness, or anger (Dennis, Cole, Wiggins, Cohen, & Zalewski, 2009). Both anger and

happiness were found to be followed by context appropriate behavioral responses, such as behavioral distraction during the delay of gratification task and problem-solving behaviors during the toy in a locked box task. Additionally, happiness was followed by the widest range of actions in the resistance to temptation task; anger was followed by the widest range of actions in the goal-blockage task; whereas sadness was followed by the narrowest range of actions in both tasks. Thus, studies based on contingency analysis have offered more detailed information about how children's emotional responses and behavioral responses precede or follow each other across short intervals. Despite some slight inconsistencies, all of these studies supported the functionalist approach toward emotion regulation, indicating that the effectiveness of a particular behavioral response depends on the children's specific goals in the specific context; such as avoidance's being effective in reducing fear toward an undesirable stimulus, but being ineffective in reducing anger toward a desired stimulus.

More recently, two more studies have examined the temporal relationship between children's emotional and behavioral responses more precisely in real time. Crockenberg and Leerkes (2004) coded 6-month-old infants' negative responses to novel stimuli into three categories at 0.1-s time intervals – reduction (higher distress to lower distress), calming (distress to neutral or positive), and escalation (neutral or positive to distress, or lower distress to higher distress). They used sequential analysis to determine the probability for reduction, calming, and escalation to co-occur (within 0.1 s) with each behavioral response at both the group and the individual level. Both gaze aversion from the stimuli and self-soothing behaviors were found to occur when infants' negative responses were undergoing reduction or calming; whereas, withdrawal behaviors were more likely to occur when infants' negativity was escalating. Although this study has provided a more precise temporal relationship between emotional and

behavioral responses, its focus on co-occurrences between the two processes has rendered it impossible to distinguish regulation by and of emotion and to determine whether the putative regulatory response is the source of the decline in negative emotion or the product of the reduction or both.

To examine the reciprocal relations between emotional and behavioral responses, a recent study first coded toddlers' negative emotions and behavioral responses second by second when the toddlers were facing a difficult toy but ignored by their parents (Ekas, Braungart-Rieker, Lickenbrock, Zentall, & Maxwell, 2011). Then the researchers used mixed-effects modeling to examine how emotional and behavioral responses predicted the display of each other and at which time intervals the predictive effects occurred (with 1-, 2-, 3-, 4-, 5-s lags). In terms of regulation by emotion, toddlers who were more negative in response to their mothers' unresponsiveness displayed more self-directed strategies at 1, 2, and 5 s lags; and displayed fewer toy-directed behaviors for the following 4 s. Facing their fathers' unresponsiveness, toddlers who were more negative displayed more parent-directed strategies at 2 s, more self-directed strategies for all 5 s, and fewer toy-directed strategies for all 5 s. When the regulation of emotion was examined, toddlers who used more parent-focused strategies became more negative and toddlers who used more toy-focused strategies became less negative. Such predictive effects occurred across 3 s when toddlers displayed these strategies with their mothers, but only occurred for 1 s with fathers. Thus, emotions were predictive of particular behaviors, and particular behaviors were predictive of regulation of emotionality; both regulation by and of emotions were evident in the systematic temporal relationships among emotional responses and regulatory behaviors in this study. Both processes occurred swiftly, highlighting the importance of microscopic analysis in emotion regulation research. The speed, duration, and effect on

magnitude of emotional response of different regulatory processes have also been found to differ by strategy in relation to context, supporting the functionalists' suggestion to interpret regulatory processes based on ongoing person-context interactions.

As reviewed above, the study of emotion regulation processes has become more precise in recent years. The regulation by and of emotions can be separately examined based on their reciprocal temporal sequence and investigated second-by-second if both processes have been coded continuously in real time. However, despite important progress in studying temporal sequences, most studies to date have only studied negative emotion, as a general category. Based on the functionalist approach and empirical evidence (e.g., Dennis, Cole, Wiggins, Cohen, & Zalewski, 2009), happiness, anger, sadness, as well as many other emotions organize one's behaviors in different ways to facilitate different goals in context. More empirical evidence is needed to reveal how different emotions regulate and are regulated by behaviors as both processes unfold in real time. As reviewed in study 1 and 2, one's emotional and behavioral responses are both influenced by one's particular sociocultural backgrounds. The extent to which emotional and behavioral responses generate changes in each other in real time operation, and in which directions the changes occur may all differ across different emotions, contexts, age groups, and nationalities. To date, no empirical effort to my knowledge addressed all of these factors in the same study.

By examining the reciprocal temporal relationships between emotional and behavioral responses in real time among both American and Chinese preschoolers across two challenging contexts, the current study aimed to distinguish the regulation by and of emotion processes empirically. It was further hypothesized that happiness, anger, and sadness had different likelihoods to generate children's different behavioral responses. Consistent with the

functionalist approach (Barrett, 2013; Barrett & Campos, 1987) and empirical evidence (Dennis, Cole, Wiggins, Cohen, & Zalewski, 2009), happiness and anger were expected to generate more context-focused behaviors such as focal attention and distraction; whereas sadness was expected to generate more emotion-focused self-modification behaviors such as focal avoidance and self-soothing. On the other hand, different behaviors were hypothesized to have different likelihoods to generate emotions. Considering the challenging characteristic of the context and the existing evidence about the regulatory function of different behaviors (e.g., Buss & Goldsmith, 1998; Grolnick, Bridges, & Connell, 1996), focal attention was expected to lead to more anger and sadness and less happiness. Distraction was expected to lead to more happiness and less anger. Focal avoidance and self-soothing were expected to lead to more happiness and less sadness. Whether these patterns would be consistent across the two samples and the two challenging contexts was open for exploration.

Method

Participants

Same as study 1.

Procedure

Same as study 1 and 2.

Based on the data cleaning and reduction procedures in study 1 and 2, the following categories of emotions and behaviors were analyzed in the current study (see Table 10).

Table 10

Emotions and Behaviors in the Resistance to Temptation and Standard Violation Tasks

Variables	Definition
Emotions	
Happiness	Facial, vocal, or bodily indicators of happiness, such as a smile, laughter, or an excitable burst of movement.
Anger	Facial, vocal, or bodily indicators of anger, such as furrows between the inner eyebrows, harsh screaming, or irritable protesting behaviors.
Sadness	Facial, vocal, or bodily indicators of sadness, such as raised oblique eyebrows and curved down outer eyebrows, whining, or head down with other sad indicators.
Behaviors	
Focal Attention	All focal object directed behaviors, including attention to the focal toy, talking about the focal toy, play with the focal toy, and problem-solving/repairing attempts with the focal toy.
Distraction	All purposeful nonfocal directed approaching behaviors, including attention and interaction with other objects (e.g., furniture) and social partner (e.g., teacher or mother) in the room, and active self-entertaining activities (e.g., singing, dancing, jumping, etc.).
Self-soothing	Noninstrumental, repetitive behaviors directed toward the self, without evident attention to such behaviors.
Focal Avoidance	The child was originally touching or paying attention to the focal toy. Then the child withdraws attention from the toy, but does not direct the attention to anything else meaningful.

Results

To examine the real-time processes of regulation by and of emotion, the analyses were focused on how, in the two challenging contexts (resistance to temptation and standard violation), children's different emotional responses were systematically and immediately followed by different behavioral responses and how different behavioral responses were systematically and immediately followed by different emotional responses. Lag sequential analyses were applied to examine the likelihoods for each behavioral response to occur after different emotional responses and the likelihoods for each emotional response to occur after different behavioral responses. Transitional probabilities were computed for each possible regulation by emotion process (i.e., probabilities of focal attention after anger, self-soothing after sadness, distraction after happiness,

etc.) and each possible regulation of emotion process (anger after focal attention, sadness after self-soothing, happiness after distraction, etc.) for each sample in each task. Transition probabilities calculate the likelihood of an event (e.g., happiness) following another event (e.g., distraction), given the total number of instances of the previous event:

$$P(Distraction \rightarrow Happiness) = \frac{Frequency(Distraction \rightarrow Happiness)}{Frequency(Distraction)}$$

Transition probabilities capture the sequential nature of emotion regulation processes because they require specification of the ordered relations between emotional responses and regulatory behaviors. Based on existing studies on emotion regulation (e.g., Buss & Goldsmith, 1998; Ekas et al., 2011) and to capture enough transitional sequences for analysis, a time window from the start of the antecedent response (e.g., distraction) until 5 s after the end of the antecedent response was used to determine consequent response (e.g., happiness) that immediately followed the initiation of the antecedent response (e.g., distraction). By using such a time window, the consequent response was allowed to occur at the same time as and/or after the antecedent response, but within 5 s following the antecedent response. The consequent response could never occur before the antecedent response.

Tables 11 to 14 show the frequency of each emotion-to-behavior and behavior-to-emotion sequence in the resistance to temptation and standard violation contexts among the Chinese and American preschoolers.

Table 11

Frequency of Emotion → Behavior Sequence in the American Sample

	Resist Temptation					Standard Violation				
	Focal	Avoid	Soothe	Distract	Total	Focal	Avoid	Soothe	Distract	Total
Happy→	55	11	90	340	496	133	2	29	166	330
Angry→	15	4	26	79	124	24	1	6	26	57
Sad→	19	7	37	121	184	33	0	12	56	101
Total	89	22	153	540	804	190	3	47	248	488

Note: “Focal” = attention to, verbalization about, or physical interaction with the focal toy; “Soothe” = self-soothing behaviors; “Avoid” = gaze aversion or body aversion from the focal toy, without purposeful attention to anything meaningful; “Distract” = attention to or interaction with nonfocal object, social partner, or self-activities.

Table 12

Frequency of Emotion → Behavior Sequence in the Chinese Sample

	Resist Temptation					Standard Violation				
	Focal	Avoid	Soothe	Distract	Total	Focal	Avoid	Soothe	Distract	Total
Happy→	26	6	19	54	105	47	3	21	43	114
Angry→	3	3	3	2	11	29	1	17	25	72
Sad→	13	7	9	9	38	11	4	6	14	35
Total	42	16	31	65	154	87	8	44	82	221

Table 13

Frequency of Behavior → Emotion Sequence in the American Sample

	Resist Temptation				Standard Violation			
	Happy	Angry	Sad	Total	Happy	Angry	Sad	Total
Focal→	50	12	14	76	52	9	13	74
Avoid→	15	2	5	22	2	2	0	4
Distract→	86	22	29	137	26	6	10	42
Soothe→	116	24	38	178	76	14	21	111
Total	267	60	86	413	156	31	44	231

Table 14

Frequency of Behavior → Emotion Sequence in the Chinese Sample

	Resist Temptation				Standard Violation			
	Happy	Angry	Sad	Total	Happy	Angry	Sad	Total
Focal→	26	2	12	40	16	10	4	30
Avoid→	5	2	6	13	5	2	2	9
Distract→	29	1	6	36	20	15	6	41
Soothe→	22	2	7	31	21	19	7	47
Total	82	7	31	120	62	46	19	127

In order to examine whether the observed emotion to behavior and behavior to emotion sequences were more or less likely than chance, transition probabilities were pooled across all

children of the same culture and in the same context and tested with Pearson χ^2 . Using chance-expected frequencies as the comparison indicates how likely a consequent response is to occur within the time interval after the antecedent response, in contrast to all other responses. Note that direction was considered in these analyses; only a particular sequence (behavior to emotion or emotion to behavior) was compared to other possibilities for that same sequence (e.g., probability of anger to focal attention was compared to probability of the sequence of anger to all other types of behaviors). Thus, this is a conservative way of determining whether baserates of the various sequences exceeded levels one might expect by chance.

$$\chi^2 = \sum \frac{(obs - exp)^2}{exp}$$

obs: observed frequency of the target sequence

exp: expected frequency of the target sequence

$$exp = \frac{Row\ Total \times Column\ Total}{Grand\ Total}$$

Unfortunately, results of these pooled analyses indicated that only Chinese children's sadness→avoidance and American children's avoidance→anger sequences in the standard violation context occurred at above chance level. Given the small number of sequences that occurred with nonchance probability, it was not appropriate to use findings as the basis for generalizations to the population. Therefore, lag sequential comparisons were conducted only to describe differences in likelihood of behavior to emotion versus emotion to behavior sequences' occurrence as observed in the current dataset, with no inferences being made about the populations. Tables 15 – 18 show the transition probability of each emotion to behavior and behavior to emotion sequence in the resistance to temptation and standard violation contexts among the Chinese and American preschoolers.

Table 15

Transition Probability of Emotion → Focal Attention and Focal Attention → Emotion Sequence

Transitional Probability (antecedent → consequent)	Resistance to Temptation				Standard Violation			
	CN		US		CN		US	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Happy → Focal	.13	.22	.08	.09	.24	.33	.38	.26
Focal → Happy	.39	.48	.40	.46	.21	.39	.53	.47
Anger → Focal	.03	.09	.03	.07	.13	.23	.12	.23
Focal → Anger	.03	.17	.08	.21	.16	.35	.08	.22
Sad → Focal	.03	.11	.03	.08	.03	.11	.13	.21
Focal → Sad	.05	.18	.13	.31	.02	.10	.13	.31

Table 16

Transition Probability of Emotion → Distraction and Distraction → Emotion Sequence

Transitional Probability (antecedent → consequent)	Resistance to Temptation				Standard Violation			
	CN		US		CN		US	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Happy → Distract	.24	.31	.55	.34	.14	.23	.37	.26
Distract → Happy	.38	.49	.63	.41	.25	.41	.57	.45
Anger → Distract	.02	.08	.22	.35	.08	.18	.13	.24
Distract → Anger	.03	.17	.09	.20	.21	.41	.11	.25
Sad → Distract	.03	.10	.36	.40	.06	.17	.17	.27
Distract → Sad	.06	.24	.23	.37	.07	.22	.14	.28

Table 17

Transition Probability of Emotion → Soothe and Soothe → Emotion Sequence

Transitional Probability (antecedent → consequent)	Resistance to Temptation				Standard Violation			
	CN		US		CN		US	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Happy → Soothe	.11	.17	.13	.12	.07	.12	.08	.13
Soothe → Happy	.32	.46	.52	.45	.24	.40	.32	.45
Anger → Soothe	.03	.09	.05	.10	.07	.14	.03	.10
Soothe → Anger	.03	.17	.09	.19	.21	.39	.10	.28
Sad → Soothe	.04	.13	.09	.13	.02	.07	.04	.10
Soothe → Sad	.08	.26	.19	.33	.05	.18	.16	.35

Table 18

Transition Probability of Emotion → Avoid and Avoid → Emotion Sequence

Transitional Probability (antecedent → consequent)	Resistance to Temptation				Standard Violation			
	CN		US		CN		US	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Happy → Avoid	.02	.09	.01	.03	.01	.03	.00	.02
Avoid → Happy	.12	.33	.22	.41	.07	.25	.05	.23
Anger → Avoid	.02	.10	.01	.03	.00	.02	.00	.01
Avoid → Anger	.01	.09	.02	.11	.04	.19	.05	.23
Sad → Avoid	.01	.06	.01	.03	.01	.05	.00	.00
Avoid → Sad	.04	.19	.04	.19	.03	.17	.00	.00

Comparison between Regulation by Emotion and Regulation of Emotion

To examine whether regulation by and of emotion patterns were distinguishable processes, a series of within-subject multivariate analysis of covariance (MANCOVA) were conducted on transition probabilities in each context, with Culture and Gender as the between-subject factor, emotion to behavior versus behavior to emotion sequences (Sequence) as the within-subject factor, and Age as the covariate. Although significance was used to determine which factors to remove from analyses, the final analyses were used only to determine if, for each particular behavior-emotion pair, the behavior more frequently systematically followed the emotion than preceding it (emotion more commonly promoted/regulated the behavior) in our sample. In contrast, to the extent that the emotion more systematically followed than preceded the behavior, that behavior would be viewed as promoting that emotion. As indicated earlier, this parsing of regulation by and of emotion was executed with full recognition that these both are dynamic, mutually influential, recursive processes and that in most cases both are likely to be operating. Moreover, it is also clear that systematic promotion of the consequent response (behavior or emotion) is just one of many potential types of regulatory processes that could be studied.

Emotion \leftrightarrow Focal Attention sequences. In the resistance to temptation context, Culture, Age, and Gender did not show any significant between-subject effects or interactions, and thus were removed from the final analyses. A within-subject effect was found for Sequence. Follow-up univariate analyses of variance (ANOVAs) indicated that the Focal \rightarrow Happy versus Happy \rightarrow Focal sequences differed from each other (*partial* $\eta^2 = .37$) and the Focal \rightarrow Sad versus Sad \rightarrow Focal sequences differed as well (*partial* $\eta^2 = .07$). Referring to the results in

Table 15, children's focal attention was more likely to precede rather than follow their happiness and sadness in this context.

In the standard violation task, significant multivariate effects were found for Culture, $F(3, 66) = 7.28, p < .001, \text{partial } \eta^2 = .25$; and a two-way Gender \times Sequence interaction, $F(3, 66) = 3.67, p = .017, \text{partial } \eta^2 = .14$, so all factors were included. Follow-up univariate analyses of covariance (ANCOVAs) indicated that children from the two samples differed in their patterns of Happy \leftrightarrow Focal sequences. Referring to the results in Table 15, American children had more of the Happy \leftrightarrow Focal sequences than Chinese children. When the Gender \times Sequence interaction was considered, the male and female children differed in direction of typical sequence for Sad \rightarrow Focal versus Focal \rightarrow Sad ($\text{partial } \eta^2 = .12$). As Figure 4 indicates, female children's sadness was more likely to follow focal attention, whereas male children's sadness was more likely to precede focal attention in the standard violation context.

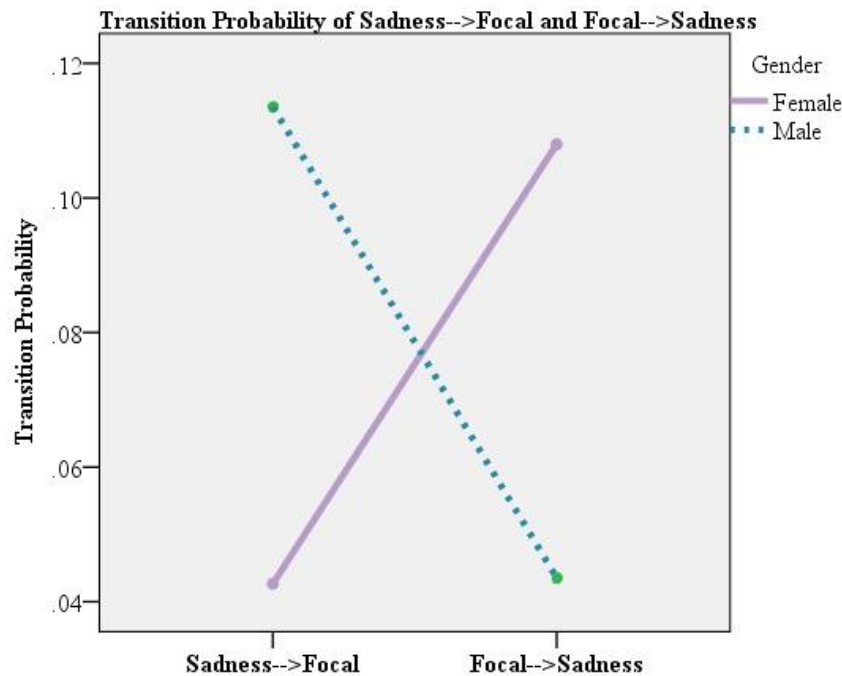


Figure 4. Differences between sadness-to-focal attention and focal attention-to-sadness sequences in the standard violation context. Transition probability = Frequency of antecedent \rightarrow consequent pattern/Frequency of antecedent.

Emotion \leftrightarrow Distraction sequences. In the resistance to temptation task, gender did not show any significant between-subject effect or interactions, and thus was removed from the final analyses. A significant main effect was found for Culture, $F(3, 68) = 13.46, p < .001$, $partial \eta^2 = .37$, but this was qualified by a significant Culture \times Sequence interaction, $F(3, 68) = 4.15, p < .01$, $partial \eta^2 = .16$, so both of these factors were retained. Follow-up univariate analyses of covariance (ANCOVAs) indicated that children from the two samples differed in their patterns of Happy \leftrightarrow Distraction ($partial \eta^2 = .16$), Anger \leftrightarrow Distraction ($partial \eta^2 = .08$), and Sad \leftrightarrow Distraction ($partial \eta^2 = .08$). Referring to the results in Table 16, American children had more of these sequences than the Chinese children in the resistance to temptation context. When the Culture \times Sequence interaction was considered, the American and Chinese children differed in direction of their typical sequences of Anger \rightarrow Distract versus Distract \rightarrow Anger ($partial \eta^2 = .07$) and Sad \rightarrow Distract versus Distract \rightarrow Sad ($partial \eta^2 = .08$). As Figure 5 indicates, American children's anger and sadness were both more likely to precede rather than follow distraction; whereas Chinese children rarely showed either sequence direction.

In the standard violation task, gender did not show any significant between-subject effect or interactions, and thus was removed from the final analyses. A significant main effect was found for Culture, $F(3, 67) = 5.08, p = .003$, $partial \eta^2 = .19$, so this factor was retained. Follow-up univariate analyses of covariance (ANCOVAs) indicated that children from the two samples differed their patterns of Happy \leftrightarrow Distraction ($partial \eta^2 = .15$). Referring to the results in Table 16, American children had more Happy \leftrightarrow Distraction sequences than the Chinese children in the standard violation context.

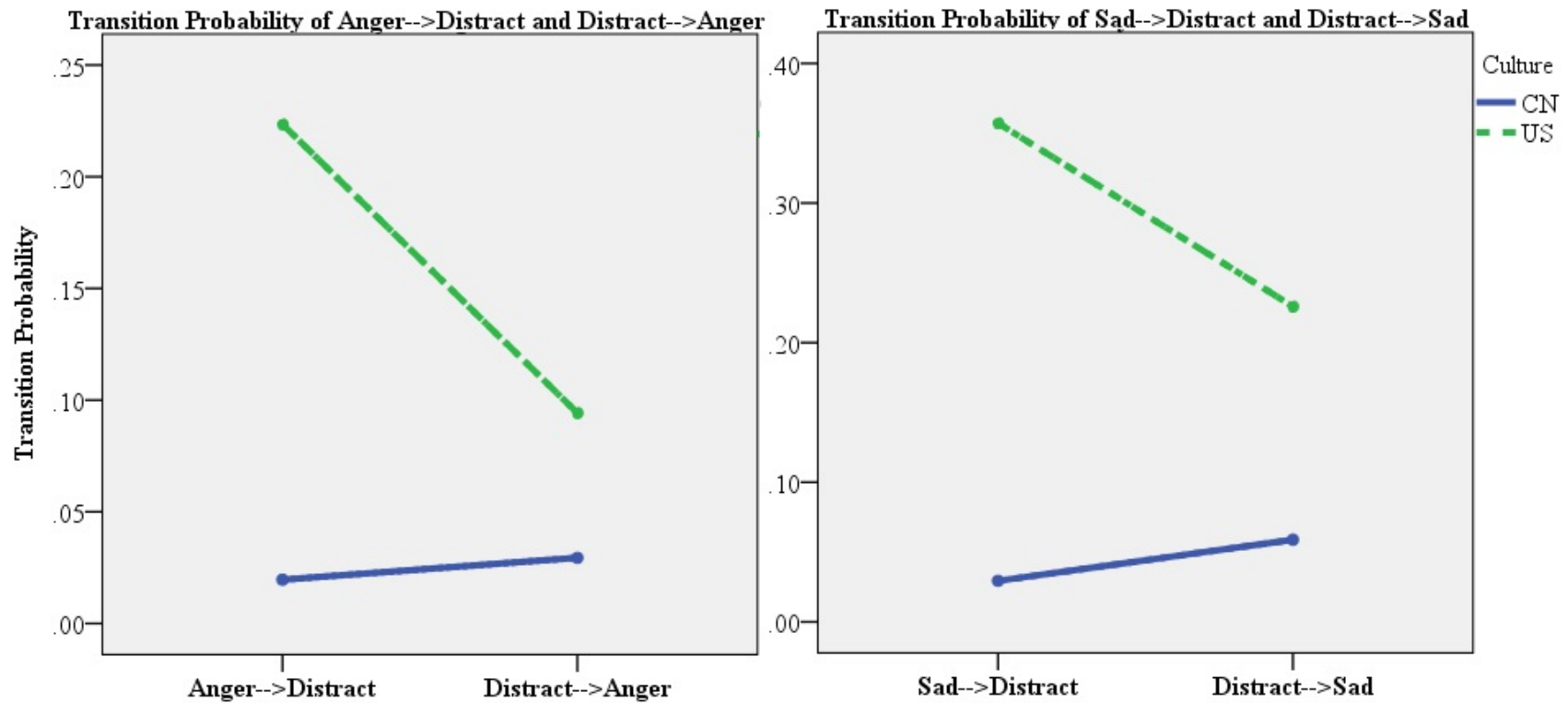


Figure 5. Differences between emotion-to-distraction and distraction-to-emotion sequences in the resistance to temptation context. Transition probability = Frequency of antecedent \rightarrow consequent pattern/Frequency of antecedent; CN = Chinese preschoolers; US = American preschoolers.

Emotion \leftrightarrow Self-soothing sequences. In the resistance to temptation task, gender did not show any significant between-subject effect or interactions, and thus was removed from the final analyses. A significant main effect was found for Culture, $F(3, 68) = 3.74, p = .015, \text{partial } \eta^2 = .14$, but this was qualified by a significant Culture \times Sequence interaction, $F(3, 68) = 3.58, p = .018, \text{partial } \eta^2 = .14$, so these factors were retained. Follow-up univariate analyses of covariance (ANCOVAs) indicated that children from the two samples differed in their Happy \leftrightarrow Soothe sequences ($\text{partial } \eta^2 = .06$). Referring to the results in Table 17, American children had more of this sequence than the Chinese children in the resistance to temptation context. When the Culture \times Sequence interaction was considered, the American and Chinese children differed in typical direction of their sequences of Happy \rightarrow Soothe versus Soothe \rightarrow Happy ($\text{partial } \eta^2 = .06$). As Figure 6 indicates, although both American and Chinese children's self-soothing was more likely to precede rather than follow happiness, the difference between Happy \rightarrow Soothe and Soothe \rightarrow Happy was especially large for American children.

In the standard violation context, Culture, Age, and Gender did not show any significant between-subject effects or interactions, and thus were removed from the final analyses. A significant within-subject effect was found for Sequence, $F(3, 69) = 19.76, p < .001, \text{partial } \eta^2 = .46$. Follow-up univariate analyses of variance (ANOVAs) indicated that the following pairs of self-soothing \rightarrow emotion sequences all were more common than emotion \rightarrow self-soothing sequences: Soothe \rightarrow Happy versus Happy \rightarrow Soothe sequences ($\text{partial } \eta^2 = .24$), Soothe \rightarrow Anger versus Anger \rightarrow Soothe sequences ($\text{partial } \eta^2 = .12$), and Soothe \rightarrow Sad versus Sad \rightarrow Soothe sequences ($\text{partial } \eta^2 = .09$ (see Table 17).

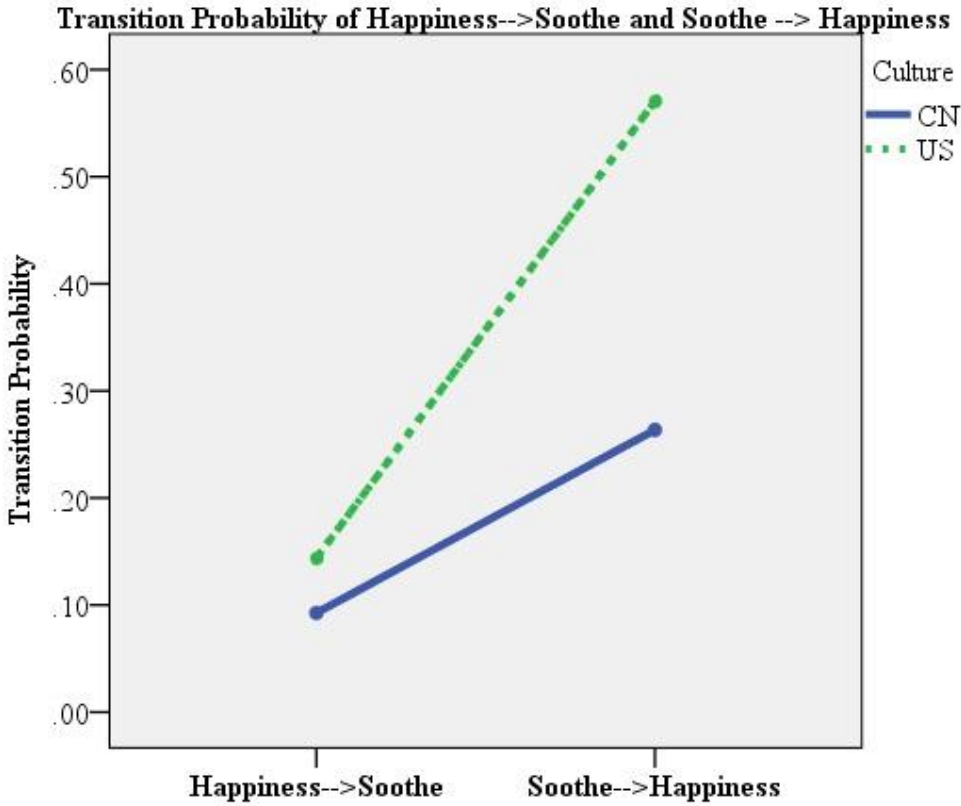


Figure 6. Differences between emotion-to-soothe and soothe-to-emotion sequences in the resistance to temptation context. Transition probability = Frequency of antecedent \rightarrow consequent pattern/Frequency of antecedent; CN = Chinese preschoolers; US = American preschoolers.

Emotion \leftrightarrow Focal Avoidance sequences. In the resistance to temptation task, Culture, Age, and Gender did not show any significant between-subject effects or interactions, and thus were removed from the final analyses. A significant within-subject effect was found for Sequence, $F(3, 70) = 6.28, p = .001, \text{partial } \eta^2 = .21$. Follow-up univariate analyses of covariance (ANOVAs) indicated that the Avoid \rightarrow Happy versus Happy \rightarrow Avoid sequences differed from each other ($\text{partial } \eta^2 = .17$). Referring to the results in Table 18, children's focal avoidance was more likely to precede rather than follow their happiness in the resistance to temptation context.

Similarly, in the standard violation task, Culture, Age, and Gender did not show any significant between-subject effects or interactions, and thus were removed from the final analyses. A significant within-subject effect was found for Sequence, $F(3, 69) = 3.04, p = .035$, $partial \eta^2 = .12$. Follow-up univariate analyses of covariance (ANOVAs) indicated that the Avoid \rightarrow Happy versus Happy \rightarrow Avoid sequences differed significantly from each other ($partial \eta^2 = .06$). Referring to the results in Table 18, children's focal avoidance was more likely to precede rather than follow their happiness in the standard violation context.

The aforementioned findings provided evidence that we can distinguish between some regulation by emotion and regulation of emotion sequences in both the resistance to temptation and standard violation contexts in the current observation. In both tasks, self-soothing and focal avoidance were more likely to precede than to follow happiness for all children (see Table 19 for a summary of results). In the resistance to temptation task, focal attention was more likely to precede rather than follow happiness and sadness for all children. Anger and sadness were more likely to precede rather than follow distraction for American children. In the standard violation task, males' sadness was more likely to precede rather than follow focal attention, whereas females' sadness was more likely to follow rather than preceding focal attention. Self-soothing was more likely to precede rather than follow anger, and sadness in the standard violation task, in addition to preceding happiness in both contexts. Further analyses on regulation of the same behavior by different emotions and regulation of the same emotion by different behaviors were conducted to clarify some of the abovementioned findings. In conceptualizing these findings, it is also important to remember that Distraction \leftrightarrow emotion and Happiness \leftrightarrow Soothe sequences were more common among American than Chinese children.

Table 19
Summary of significant results

Effect	More common order	Context
Sequence (beh→emo vs. emo→beh)	Focal → Happy	Resist temptation
Sequence (beh→emo vs. emo→beh)	Focal → Sad	Resist temptation
Gender × Sequence	Females: Focal→Sad	Standard violation
	Males: Sad→Focal	
Culture × Sequence	Americans: Anger→distract; Sad→distract	Resist temptation
	Chinese: little distraction	
Culture × Sequence	Soothe→Happy; especially for Americans	Resist temptation
Sequence	Soothe→Happy; Soothe→Anger; Soothe→Sad	Standard violation
Sequence	Avoid→Happy	Resist temptation
Sequence	Avoid→Happy	Standard violation

Regulation by Different Behavioral Responses

In the resistance to temptation task, focal attention was more likely to precede than follow both happiness and sadness. Thus, a paired *t*-test was conducted to clarify which emotion was more likely to follow focal attention. Referring to results in Table 15, happiness was more likely than sadness to follow focal attention in this context. Thus, although looking at the temptation toy systematically promoted sadness in children; it was even more likely to promote happiness, which may explain children's continued tendencies to look at it despite instructions not to touch it.

In the same resistance to temptation task, focal attention, self-soothing, and avoidance of the temptation toy were all more likely to precede rather than follow happiness for all children. Thus, a within-subject multivariate analysis of variance (MANOVA), with planned comparisons between Avoidance and the other two behaviors and between focal attention and self-soothing was conducted to clarify which behavior(s) were more likely to lead to happiness. A multivariate effect was found for Behavior (*partial* $\eta^2 = .24$). Within-subjects contrasts indicated that focal attention and self-soothing were more likely than avoidance to precede happiness (*partial* $\eta^2 = .24$). But there was no significant difference between focal attention and self-soothing in the

likelihoods of preceding happiness (see Figure 7). Thus, although all three behaviors systematically preceded happiness, focal attention and self-soothing were more likely to do so than avoidance.

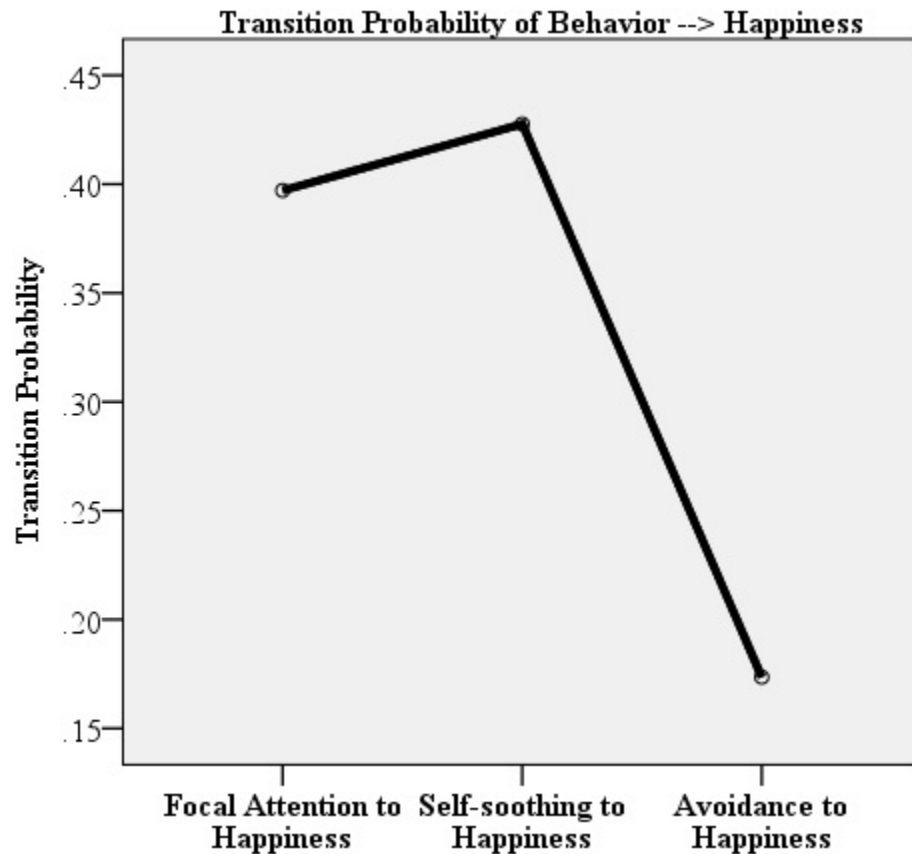


Figure 7. Differences in transition probabilities from focal attention, self-soothing, and focal avoidance to happiness in the resistance to temptation context. Transition probability = $\text{Frequency of antecedent} \rightarrow \text{consequent pattern} / \text{Frequency of antecedent}$.

In the standard violation task, both self-soothing and avoidance were more likely to precede rather than follow happiness. Referring to results in Table 17 and 14, self-soothing was more likely than avoidance of the temptation toy to precede happiness.

For all children in the standard violation task, self-soothing was more likely to precede rather than follow all three emotions of happiness, anger, and sadness. Thus, a within-subject multivariate analysis of variance (MANOVA) was conducted, with contrasts comparing: 1,

happiness versus anger and sadness and 2. anger versus sadness, to clarify whether the likelihoods for the three emotions to follow self-soothing were different. The contrasts indicated that the likelihood for happiness to follow self-soothing was greater than the likelihoods for anger and sadness to follow self-soothing ($partial \eta^2 = .08$). However, there was little difference in the likelihoods for anger versus sadness to follow self-soothing (see Figure 8).

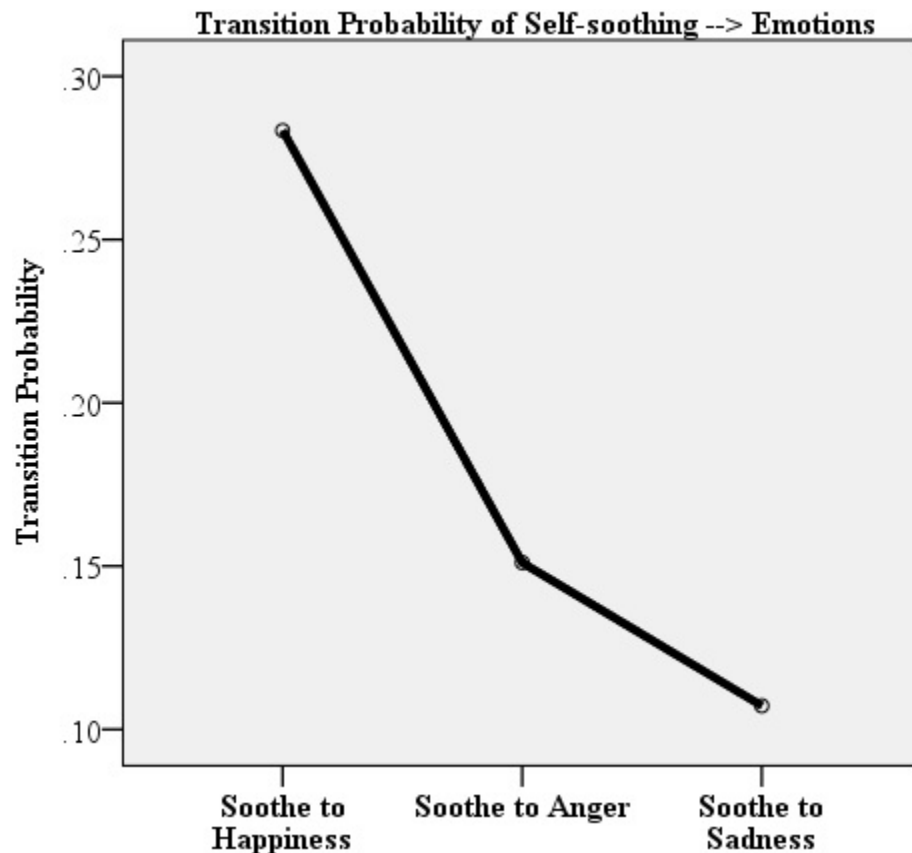


Figure 8. Differences in transition probabilities from self-soothing to each emotion in the standard violation context. Transition probability = Frequency of antecedent \rightarrow consequent pattern/Frequency of antecedent.

Discussion

This study aimed to distinguish processes of regulation by and of emotion empirically when Chinese and American preschoolers were challenged by the same social rules.

Unfortunately, baserates for various behaviors and emotions differed greatly, with some

emotions and behaviors being extremely infrequent or absent for particular children, and others occurring most of the time. As a result, rates for particular directional sequences did not differ from rates expected by chance, and interpretation of all analyses must be limited to the description of relative frequency of sequences in the current dataset.

In the resistance to temptation task, focal attention, self-soothing, and avoidance of the temptation toy were more likely to precede than follow happiness. All three behaviors functioned more as regulation of emotion than regulation by emotion in this context. Happiness was more likely to follow rather than precede these behaviors, supporting the regulatory role of these behavioral responses in promoting positive emotions in this challenging context. These findings on self-soothing and avoidance were consistent with previous discovery that these behaviors were effective in decreasing negative arousal (Buss & Goldsmith, 1998; Stifter & Braungart, 1995). However, focal attention was not expected to lead to happiness in that it involved attention to a forbidden toy. Moreover, among the three behaviors, focal attention and self-soothing were even more likely than avoidance to precede happiness. However, the reason that focal attention preceded happiness might be quite different from both self-soothing and avoidance. The fact that focal attention was more likely to precede rather than follow both happiness and sadness offered further information about this, as looking at the forbidden toy seems to have triggered mixed emotional responses among the children. It seems likely that children were excited about the attractive toy, but also sad about being required not to touch the toy. Thus, the resistance to temptation task was successful in eliciting children's excitement toward the toy as well as sadness with the rule. As the focal attention→happiness sequence was more common than both the avoidance→happiness and focal attention→sadness sequences, the focal attention→happiness sequence seems to be a more dominant pattern, supporting the

inference that children really did like the temptation toy, and their refraining from touching it was due to the rule imposed in the experiment, rather than because the toy was simply unattractive.

In the resistance to temptation task particularly, the regulating role of anger and sadness on distraction was identified more clearly among the American preschoolers (anger and sadness were more likely to precede rather than follow distraction) than the Chinese. Anger and sadness associated with resisting temptation may have systematically led American children to actively distract themselves, which, according to prior research (Cole, et al., 2011), is associated with ability to resist temptation for a longer time. Consistent with this interpretation, American children were able to wait significantly longer before touching the temptation object, in comparison to Chinese children. Anger was expected to show such a regulating function on active approach behaviors; whereas, sadness was not initially expected to regulate distraction in this way. However, it seems likely that the sadness in this context resulted from children's inability to play with the attractive temptation toy, such that it may have successfully inhibited interaction with that toy, but not with other objects. Given that the session ended when the child touched the temptation toy, it was not possible to look systematically at such interaction with the toy as a consequence of sadness. However, perhaps especially given that sadness was relatively infrequent and of low intensity, as demonstrated in Study 1, it seemed to promote rather than undermine children's ability to find alternative activities; thus American children were still able to seek distracting activities.

Between the two groups, American children showed more distraction \leftrightarrow emotion sequences in both the resistance to temptation and standard violation tasks and more happiness \leftrightarrow soothing sequences in the resistance to temptation task than the Chinese children. Referring

to the findings in study 1 and 2, American children's general greater display of distraction, happiness, and sadness, as well as their greater display of anger in the resistance to temptation task might be an important influence on these observed cultural differences in emotion-behavior sequences. This baseline issue is consistent with the finding that the rate of these sequences did not differ from that expected by chance.

In the standard violation task, self-soothing and avoidance of the broken rag doll were more likely to precede than follow happiness. Thus the regulating role of these two behaviors was consistent with the findings in the resistance of temptation task and with previous studies. In contrast to findings for the resistance to temptation context, focal attention was not more likely to precede than follow happiness in the standard violation task. Probably because the attractive toy was replaced with a broken toy in the standard violation task, focal attention no longer systematically elicited joy in the children. However, the function of focal attention varied between male and female children in the standard violation task. It was more likely to precede sadness among the girls, but more likely to follow sadness among the boys. The females' response was consistent with the mishap context, as the experimenter asked the child to take good care of the toy, but the toy broke in the child's hand and became unfixable. Females might be more concerned about the experimenter's expectations that they take care of the toy and the toy's being broken, such that more attention to the mishap led to more distress in them. The females' sadness might have made them less likely to interact with the broken toy further, with those gazes at the toy that did occur just continuing to generate sadness.

In contrast to the female pattern, the males' response was contrary to expectation, as sadness was predicted to lead one to relinquish goal-directed effort. It is possible that the males were more socialized to be agentic – considering the long-lasting gender stereotype that boys fix

things and girls need things fixed (Darrow, 1970) – and less socialized to be empathetic (e.g., Garaigordobil, 2009). Therefore, even when they became sad in the standard violation task, males were mainly sad about the toy being broken, and they were able to mobilize themselves to try to fix the toy, given their strong socialization to fix things. More research is needed to see if this finding generalizes beyond the present sample given the base rate issues and, if so, to determine conditions under which sadness facilitates versus undermines problem solving.

In addition to focal attention, females' self-soothing was also more likely to precede rather than follow sadness. Across all children, self-soothing was more likely to precede rather than follow all three emotions of happiness, anger, and sadness in the standard violation task. This finding was quite unexpected because self-soothing was found to decrease negative arousal rather than leading to increase in both positive and negative arousal (Buss & Goldsmith, 1998; Stifter & Braungart, 1995). Although happiness was most likely to follow self-soothing, compared with anger and sadness, the possibility that anger and sadness systematically follow more than precede self-soothing is worth further investigation. As self-soothing didn't actually occupy or redirect the children's attention from the emotion-eliciting event, it is possible that self-soothing allows the child to continue experiencing distress and thinking about the broken toy during the investigated time window, eventually leading to anger and either focal attention or distraction. Examining three step sequences might enable us to see whether this sequence of self-soothing → anger → distraction or focal attention is more common than self-soothing → anger → self-soothing.

However, another very plausible explanation of these results is that it was due to base rate and duration differences between anger and sadness versus self-soothing. Given that anger and sadness were relatively infrequent and very rarely preceded or followed self-soothing in this

study and these sequences, like most others, did not occur at rates that significantly differed from chance, it is important to replicate this finding. Moreover, self-soothing had extremely long durations for some children, which may have made it difficult for emotions to be found to precede self-soothing given our time window that required the antecedent to begin before the consequent, but allowed the consequent to begin while the antecedent was ongoing. To the extent that self-soothing occupied much more time than the emotions, it would be difficult for emotions to precede self-soothing with much frequency. It may be that, given these base rate issues, the results were unduly influenced by a small number of cases and are not representative of population values.

In addition to the problem of low and unequal base rates, which limited the generalizability of the current study, there are a few other limitations that should be acknowledged. First, the transition probabilities were calculated using a time window from the start of the antecedent response until 5 s after the end of the antecedent response. The time window allowed a consequent response (e.g., distraction) to occur while the antecedent response (e.g., anger) was still ongoing, which reflected ecologically valid dynamics of emotion regulation processes, given that the consequent behavior is typically initiated to deal with the ongoing emotion and vice versa. However, because it was possible for the antecedent and consequent responses to co-occur or even to begin at the same time, the processes of regulation by and of emotion could not be completely differentiated. A more clearly sequential time window (e.g., 1 s after the start of the antecedent response until 5 s after the end of the antecedent response) might reduce these interpretational difficulties. Secondly, intensity increases and decreases within each emotion were not investigated in the current study. When a particular emotion → behavior → emotion sequence leads to changed intensity (but not type) of the consequent emotion,

the sequence also reflects the regulation of emotion. But, given the relatively low incidence of each intensity of each emotion in each child in each context, in the current study, different intensities of the same emotion were merged into emotional events of unspecified intensity, so it was not possible to examine this using the transition probabilities calculated for the present study.

Relatedly, transition probabilities were only used to describe one-step (two-event) sequences between categorical emotions and behaviors. However, knowing what prior response (e.g., happiness versus sadness) preceded the antecedent response (e.g., self-soothing) and what response (e.g., self-soothing versus focal attention) followed the consequent response (e.g., happiness) could lead to very different interpretations of the antecedent-consequence pattern (e.g., self-soothing→happiness). For example, the happiness→self-soothing→happiness sequence implies regulation of high intensity happiness, and the sadness→self-soothing→happiness sequence implies regulation that changes sadness to happiness, even though the self-soothing→happiness sequence was the same two-event pattern. Similarly, between the self-soothing→happiness→self-soothing and self-soothing→happiness→focal attention sequences, despite the same two event sequence of soothing→happiness, happiness maintained self-soothing in the former sequence, but generated a different behavioral response in the latter sequence. Therefore, three or more event sequences should be explored to clarify the current findings based on two event sequences.

The current study explored a wide range of empirical questions regarding the regulation by and of emotion in two different contexts and among two culturally different samples. Because of the relatively small sample and short observations on a variety of emotions, behaviors, as well as their temporal relationships, the findings should be regarded as preliminary and in need of replication. However, by applying lag sequential analyses to the transition probabilities of

different emotion-behavior sequences from both directions, the current study contributed to the growing body of research distinguishing the reciprocal processes of regulation by and of emotion. The context-specific design was useful to interpret the functionality and adaptiveness of different processes of regulation by and of emotion. A cross-cultural perspective also enriched our understanding about the generalizability and consistency of the reciprocal temporal patterns between emotions and behaviors.

CHAPTER 5 – GENERAL DISCUSSION

Three studies were conducted to examine American and Chinese 3-year-old children's emotional responses, behavioral responses, and the reciprocal relationship between emotional and behavioral responses over time to the same resistance to temptation and standard violation tasks. The three studies explored cross-cultural and cross-contextual variations in children's responses toward social challenges from different angles, and jointly provided rich information about American and Chinese children's real time response profiles in these contexts.

Extant theoretical and empirical evidence indicates that people from collectivist and individualistic cultures have systematic differences in their emotional, behavioral, and regulatory responses to social challenges (Markus & Kitayama, 1991; Rothbaum & Rusk, 2011). With a focus on personal well-being, people from individualistic cultures have more freedom to express emotions, question authority, act on the world, and change the environment to fit personal need in comparison to those from collectivist cultures. By contrast, people from collectivist cultures focus on group harmony more than personal need, and they are therefore more likely to show control over “disharmonious” emotional expressions, obedience to authority figures, and a tendency to modify themselves in order to fit with the external context, in comparison to those from individualistic cultures. Consistent with such cultural differences, American children in the current studies were found to be generally more expressive with their happiness and sadness (Study 1), display more context-modification distractive behavioral responses (Study 2), and have more emotion \leftrightarrow distraction response sequences (Study 3) than their Chinese counterparts. Facing the same challenging situations, Chinese children's happy and sad responses were slower to emerge and less intense when displayed. They were more likely to adjust themselves quietly in an emotion-centered way, such as through self-soothing and

avoidance. Thus, some of their emotion \leftrightarrow behavior sequences were less identifiable in comparison to those among the American children.

In terms of children's obedience and dependence on authority figures, Chinese children showed almost no anger in the resistance to temptation task and significantly less distractive behaviors in both the resistance to temptation and standard violation tasks than the American children. As the rule of "do not touch the toy robot" in the resistance to temptation task was explicitly announced by the experimenter, Chinese children were not expected to question or express anger about the rule or the experimenter considering their collectivist cultural background. The disharmonious emotion of anger is not welcomed, especially in public settings, in collectivist cultures. Although the "Don't" requirement was explicit in the resistance to temptation task, the "Do" expectation was unclear in both contexts. Compared with American children, who typically are socialized to be autonomous and self-dependent from early on, Chinese children more often are socialized to be more dependent on caregivers, especially in their early "age of innocence" when they were not expected to take on much personal responsibilities. Thus, although American children initiated a variety of distractive responses to deal with the emotionally challenging context by interacting with objects, social partners, and self-engaging activities, Chinese children showed much less of these context-modification responses. It is possible that the Chinese children had been less empowered than the American children to self-initiate responses and change the external context.

With greater freedom to express emotions and to engage in a variety of distractive behaviors, American children's responses across the observation were consistent with expectation: Their happiness was greater in the pleasant episodes, and their anger and sadness were greater in the challenging episodes. However, probably because of the greater control over

emotions and less access to distractive behaviors, Chinese children's anger was almost absent in the resistance to temptation task but kept increasing afterwards, even when they were introduced to a new toy and encouraged to play with the toy. Thus, American children's responses seemed to be more readily responsive to contextual changes whereas Chinese children's anger accrued over time.

However, Chinese children's self-soothing and focal avoidance were found to be more common in both challenging contexts. Referring to the descriptive results in Study 3, both of these behaviors preceded more than follow happiness, an effect that was also true for Americans. In fact, it was stronger for Americans for the self-soothing→happiness sequence in the resistance to temptation context. These behaviors might be effective in regulating children's emotions by increasing children's likelihood of displaying happiness. However, in Study 3, self-soothing was also found to precede more than follow anger or sadness in the standard violation context. Although it was significantly more likely to lead to happiness than the two negative emotions, its greater likelihoods to precede rather than follow negative emotions were unexpected. Given the base rate issues in Study 3, this finding should be replicated with a larger sample and more observations.

In addition, self-soothing was a very common, and frequently long-lasting behavior among these children in these emotionally arousing contexts. Thus, self-soothing was often already ongoing when a child's emotion was first observed. Because self-soothing usually lasted longer than emotion expressions, it may have been quite common for anger or sadness to occur at the same time or following self-soothing, but relatively uncommon for one of these emotions to occur before any self-soothing was displayed. As a result, the self-soothing to emotion sequences may have been more common than emotion to self-soothing sequences at least in part

because of the way antecedent-consequent sequences in the 3rd study were coded. It will be important to examine this possibility by either changing the operationalization of antecedent and consequent behavior (e.g., by using an event sequential rather than time-based sequential approach, and/or looking at multiple-event sequences). Importantly, findings in Study 3 should be interpreted with great caution because of the chance-level baserates of all target sequences. Despite the Chinese children's general greater display of focal avoidance and self-soothing, the effectiveness of these two behaviors in the contexts warrants further investigation.

As mentioned in previous chapters, the current studies suffered from several limitations, including relatively small sample sizes and short observation durations, aggregation of more fine-grained emotional and behavioral responses, choice of a time window which allowed sequential as well as concurrent emotion \leftrightarrow behavioral patterns, and target sequences being lower than chance level in the 3rd study. Additional process-oriented statistical methodologies, such as the State Space Grid and the Mixed sequential models, can be further explored to examine the processes with more depth.

By taking a culture-specific, context-specific, and process-oriented perspective, the current studies provided strong support for cross-culture, cross-context, and cross-time variations in American and Chinese young children's emotional and behavioral responses toward social challenges. The types, levels, and temporal trajectories of emotions and behaviors in the same emotion-eliciting context should not be expected to be the same among different individuals, considering their specific socialization experiences based on gender and sociocultural backgrounds. The same emotions and behaviors not only change as time goes by, but also unfold and sequence differently in response to different contexts. For parents, teachers, and especially practitioners working with immigrant families, it is important not to hold fixed assumptions

about the prototypical emotional and behavioral responses children should show. As children grow, it is important for them to develop a wide range of emotional and behavioral responses and use them flexibly to meet their personal needs and to conform to the diverse expectations of their family, school, community, and the larger society. It is important to consider age, culture, context, and sequence when interpreting behavior and not to make assumptions that a particular regulatory behavior or emotion is invariably adaptive or preferable to other forms of regulatory behavior or other types of emotion. Children of all ages can be shown to have remarkable abilities to adapt to their context and to engage in behaviors that promote socially sanctioned outcomes. It is imperative that those working with children take the time to think about the functions being served for each child at each age from each culture in each context in order to effectively promote positive development in that child.

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